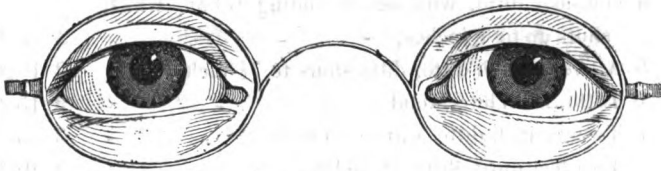


E. M. CLARKE'S
C A T A L O G U E,
§c. §c.

~~~~~  
OPTICAL INSTRUMENTS.



SPECTACLES.

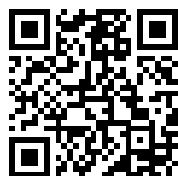
| NO. |                                                                                                                                      | £. s. d. |
|-----|--------------------------------------------------------------------------------------------------------------------------------------|----------|
| 1   | Gold Spectacles - - - 2 <i>l.</i> 2 <i>s</i> to                                                                                      | 5 5 0    |
| 2   | Best double-jointed Silver Spectacles - -                                                                                            | 1 0 0    |
| 3   | Ditto, single-joint - - - -                                                                                                          | 0 12 0   |
| 4   | Best double-joint, Blue Spring Steel ditto -                                                                                         | 0 15 0   |
| 5   | Best single-joint ditto - - - -                                                                                                      | 0 12 0   |
| 6   | Best double-joint Tortoiseshell Spectacles -                                                                                         | 0 14 0   |
| 7   | Best single-joint - - - -                                                                                                            | 0 10 0   |
| 8   | Spectacles with Glasses adapted for eyes that<br>have been couched - - - -                                                           |          |
| 9   | Goggles to correct the habit of squinting, 5 <i>s.</i> 6 <i>d.</i> to                                                                | 1 15 6   |
| 10  | Spectacles of Tortoiseshell or Silver, or blued<br>Steel, to fix on the brim of the hat, for riding,<br>hunting, or shooting - - - - |          |
| 11  | Gold Eye-rings and Glasses - - - 16 <i>s.</i> to                                                                                     | 5 5 0    |
| 12  | Silver ditto - - - - 5 <i>s.</i> to                                                                                                  | 0 10 6   |
| 13  | Tortoiseshell ditto - - - -                                                                                                          | 0 4 6    |
| 14  | Improved Gold, Hand Spectacles - -                                                                                                   | 2 12 6   |
| 15  | Silver ditto - - - - 1 <i>l.</i> 2 <i>s.</i> to                                                                                      | 5 15 6   |
| 16  | Tortoiseshell ditto - - - -                                                                                                          | 0 14 0   |
| 17  | Spectacle Cases in great variety - 6 <i>d.</i> to                                                                                    | 1 1 0    |
| 18  | Opera Glasses in a great variety of Mountings,<br>- - - - 7 <i>s.</i> 6 <i>d.</i> to                                                 | 5 5 0    |

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## TELESCOPES.

| NO. |                                                                                         | £. s. d. |
|-----|-----------------------------------------------------------------------------------------|----------|
| 1   | Improved Pocket Telescope, shuts up to 3 inches                                         | 1 8 0    |
| 2   | One-Foot ditto, which shuts up to $5\frac{1}{2}$ inches, with three sliding tubes - - - | 1 10 0   |
| 3   | Ditto, in White Metal - - -                                                             | 2 2 0    |
| 4   | One-foot ditto, with seven sliding tubes, which shuts up to 4 inches, - - -             | 2 2 0    |
| 5   | A two y-inch ditto, ditto shuts to $7\frac{1}{2}$ inches -                              | 2 10 0   |
| 6   | Ditto, in White Metal - - -                                                             | 3 13 0   |
| 7   | Twenty-inch ditto, ditto to 5 inches -                                                  | 3 3 0    |
| 8   | Two-feet ditto, ditto $9\frac{1}{2}$ inches -                                           | 3 10 0   |
| 9   | Ditto in White Metal - - -                                                              | 4 14 6   |
| 10  | Two-feet ditto to 6 inches - - -                                                        | 4 4 0    |
| 11  | Ditto, ditto, in White Metal - - -                                                      | -        |
| 12  | Three-feet ditto, ditto to 11 inches -                                                  | 5 5 0    |
| 13  | Three-feet ditto, to 7 inches - - -                                                     | 6 16 0   |

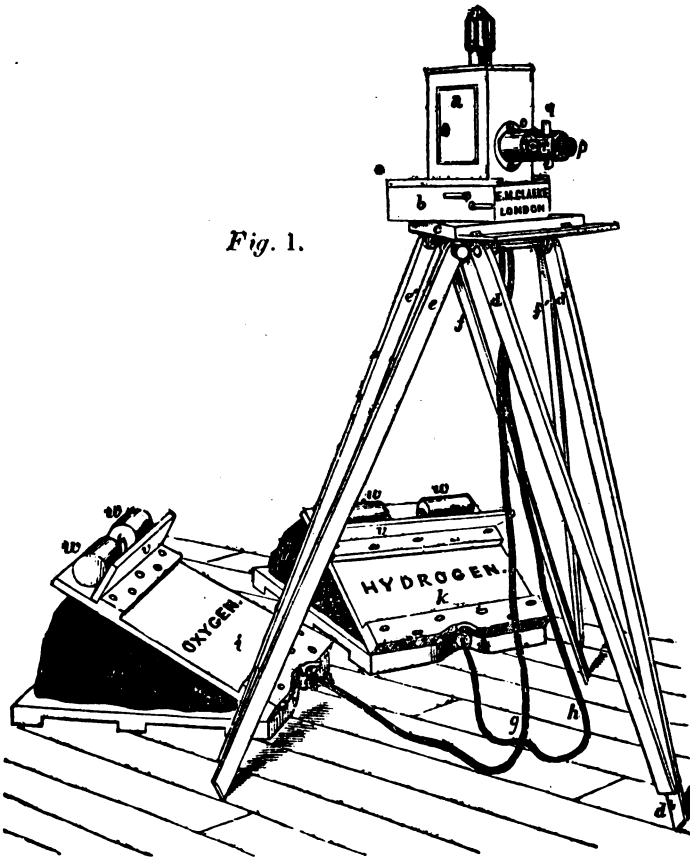
## GAS-MICROSCOPES.

## 1 E. M. Clarke's arrangement of the Gas Microscope.

—This improved form of the instrument has removed many and serious imperfections arising out of the previous constructions, *viz.* unwieldy bulk and weight, deficiency of light in the high magnifying powers, want of uniformity of light on the disc, insecurity in the blowpipe, inconvenient, fixed and dangerous position of the gas-bags, rendering them liable to communicate and explode. E. M. C. has removed these latter from their tottering position, and separated them beyond the possibility of commixture: they may even be placed, under lock and key, in a separate room, or out side the house during the exhibition of the instrument. He has further adapted Professor Daniell's Blowpipe with Maugham's Jet,

f. s. d.

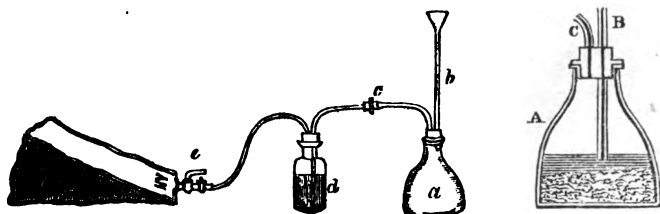
as the means of mixing the gases during combustion under circumstances which render explosion impossible. The apparatus seen at *fig. 1.* will further include 3 separate powers capable of magnifying from 10,000 to 2,000,000 times; 12 lime cylinders in a sealed bottle; 12 large sized objects preserved and rendered transparent by Canadian Balsam, and 12 small ditto, in separate mahogany frames: (these objects consist of insects, parts of insects, such as wings, and wing-

*Fig. 1.*

NO.

£. s. d.

cases, stings, tongues, eyes, dissections of the trachia and bronchial tubes, antennæ, legs, scales of butterflies and moths, zoophytes, ferns, fuci, mosses, madrepores, sections of recent and fossil woods, leaves, petals and farina of plants, feathers, and the larvæ of aquatic insects): a glass cooling trough in tin frame, with 6 small water troughs for showing the smaller class of animalculæ by the high powers; 2 large plate-glass water troughs for the lower power; 1 solid glass trough for showing decomposition of water by electrical and chemical action; cast-iron retort, with gun-barrel tubing with winged brass coupler and flexible conducting tube for making oxygen gas; lead bottle without any soldering; glass purifier for making hydrogen, see *fig. 2. a*, the bottle;

*Fig. 2.*

*b*, the funnel; *c*, the union coupler that joins it to the purifier *d*; hence to the gas bag at *e*. A section of the bottle *a*, showing the funnel-pipe *B*, purifier tube *C*. The purifier (*d*) also answers for the oxygen retort

- 30 0 0

- 2 The above instrument on a larger scale (the condensing lenses being  $4\frac{1}{8}$  inches diameter, that of the former being  $2\frac{1}{8}$  inches in diameter) better adapted for professors of universities, and scientific institutions, public lecturers, &c.

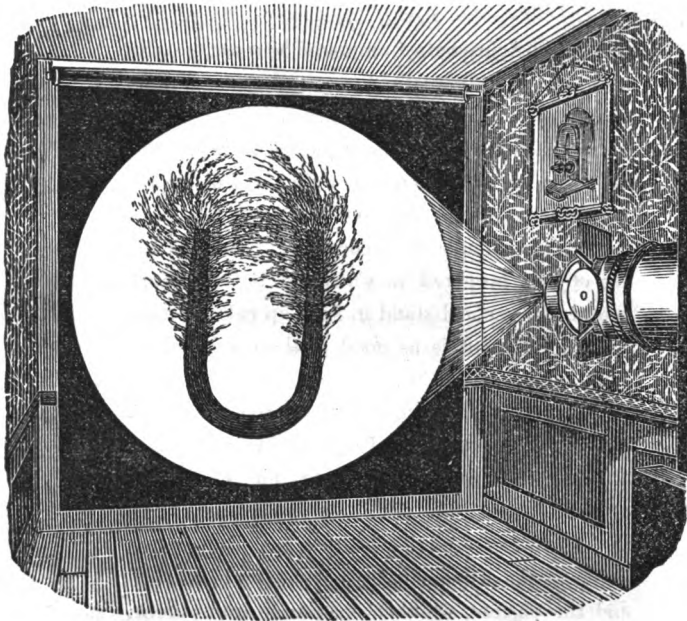
- 45 0 0

- 3 E. M. Clarke's Apparatus for showing the Form-

NO.

£. s. d.

ation of Magnetic Curves by the arrangement of minute particles of iron filings on the poles of a horseshoe magnet. The effect on the microscope-disc is most pleasing; the magnet seizing each particle as it falls, and arranging a magnetic dia-

*Fig. 3.*

gram of exquisite beauty. *Fig. 3.* will give some idea of the effect

0 7 6

- |                                                                                                                                                                                                                                                                 |                   |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|
| 4 Impressions in Glass, in Imitation of Cameos, illustrative of Heathen Mythology, Ancient and Modern History, Antique Gems, forming on the Microscope apparent disc figures in <i>basso relievo</i> , first adapted to the Gas-Microscope by Sir George Cayley | - - - from 4s. to | 0 15 0 |
| 5 Extensive Assortment of Objects prepared in Canadian Balsam for the Gas-Microscope                                                                                                                                                                            | 1s. to            | 0 10 0 |

| NO. |                                                                                                                                 | £. s. d. |
|-----|---------------------------------------------------------------------------------------------------------------------------------|----------|
| 6   | Dissections, showing the Respiratory Organs, &c., of Caterpillars, &c., Retinæ of the human Eye, sections of Teeth - - - 6s. to | 1 0 0    |
| 7   | Clock-Work to attach to Gas-Microscopes, for making the lime revolve - from 3 <i>l.</i> 3s. to                                  | 5 5 0    |

## MICROSCOPES.

- 1 Chevalier's Achromatic Compound Microscope with two sets of achromatic lenses, of three powers each, and two eye pieces to suit each set : metallic reflector fitted to the eye pieces, by which the object is strongly depicted on a sheet of paper, whereby drawings may be taken of the most minute animalculæ, &c., considerably magnified : six objects prepared in Canadian Balsam, horizontal and vertical stand in lock-up cabinet case. This Instrument is as good as those sold by the London makers at 30*l.* - - - 12 12 0
- 2 The Rev. H. Coddington's Microscope - - - 6 16 6
- 3 E. M. Clarke's improved Lucernal Microscope.— This is the best arrangement for examining opaque objects ; the field being sufficiently large to take in entire moths, beetles, &c. The peculiarity of this instrument is, that shadow is avoided, and the objects, whether opaque or transparent, can be viewed on a screen - - - 35 0 0
- 4 Wollaston's Doublet Microscope, for viewing difficult Test Objects - - - 2 2 6
- 5 Solar Microscopes - - - 7*l.* 7s. to 16 16 0
- 6 Single and Compound Pocket Microscope, with rack-work stage, four magnifying powers, insect box, twelve plain objects, and one object prepared in Canadian Balsam ; insect forceps with black and white stage ; brush, forceps and point ; concave and flat fluid glass fitted to the stage ;



| NO. |                                                                                                                                                                          | £. | s. | d. |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
|     | black and white ivory disc, and glass slip for crystallizing salts on ; all in a lock-up mahogany or rosewood case - - - -                                               | 2  | 5  | 0  |
| 7   | Ditto, ditto, with two Canadian Balsam objects and condensing lens for illuminating opaque objects                                                                       | 2  | 10 | 0  |
| 8   | Ditto, ditto, ditto, with three objects prepared in Canadian Balsam ; and a jointed pillar, so that the microscope may be set at any angle - -                           | 3  | 0  | 0  |
| 9   | Ditto, ditto, ditto, ditto, with four objects prepared in Canadian Balsam, folding tripod stand                                                                          | 4  | 0  | 0  |
| 10  | Single Pocket Microscope, with sliding stage, three magnifying powers, forceps, and point. In mahogany box - - - -                                                       | 0  | 12 | 6  |
| 11  | Ditto, black and white opaque disc, concave fluid glass - - - -                                                                                                          | 0  | 15 | 6  |
| 12  | Ditto ditto, Reflecting Mirror, twelve plain objects, insect box, glass slip for crystallizing salts, spring forceps with black and white stage, brush and point - - - - | 1  | 5  | 0  |
| 13  | Folding Pocket Microscope, in paper case -                                                                                                                               | 0  | 2  | 6  |
| 14  | Ditto, with spring forceps - - -                                                                                                                                         | 0  | 5  | 0  |
| 15  | Coddington's Lens, mounted in Silver, for viewing opaque and transparent objects - -                                                                                     | 0  | 16 | 0  |
| 16  | Ditto, mounted in folding 'Tortoiseshell case -                                                                                                                          | 0  | 12 | 6  |
| 17  | Stanhope's Lens, mounted in Tortoiseshell folding case - - - -                                                                                                           | 0  | 8  | 6  |
| 18  | Ditto in Electrum, Silver or Gold 3 <i>s.</i> 9 <i>d.</i> , 10 <i>s.</i> 6 <i>d.</i>                                                                                     | 1  | 1  | 0  |
| 19  | Single, Double, and Triple magnifying Lenses, in folding tortoiseshell case - from 2 <i>s.</i> 6 <i>d.</i> to                                                            | 0  | 12 | 6  |
| 20  | Condensers, with Candle-holder on Brass Sliding Stand - - - - 16 <i>s.</i> to                                                                                            | 1  | 6  | 0  |
| 21  | Ditto for viewing opaque Objects - 6 <i>s.</i> 6 <i>d.</i> to                                                                                                            | 1  | 10 | 0  |
| 22  | Achromatic Object Glasses fitted to Microscopes - - - - 1 <i>l.</i> 4 <i>s.</i> to                                                                                       | 6  | 6  | 0  |
| 23  | Wollaston's Doublet ditto ditto - 15 <i>s.</i> to                                                                                                                        | 1  | 0  | 0  |
| 24  | An extensive Assortment of Objects for achromatic                                                                                                                        |    |    |    |

| No.   |                                                                                                                                                                                                                                                                                                  | £. s. d. |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|       | and plain Microscopes, by French and English artists - - - - - 1s. to                                                                                                                                                                                                                            | 0 5 0    |
|       | These objects consist of insects and dissections of insects, zoophytes, algæ, fuci, mosses, sponges and ferns, prepared in Canadian Balsam: shells, scales, ditto in flint, fossil infusoria; madrepores, transverse and longitudinal sections of recent and fossil woods, bones, teeth, &c. &c. |          |
| 25    | Fossil Infusoria, unprepared, in small box -                                                                                                                                                                                                                                                     | 0 0 6    |
| 26    | A Collection of ten Microscopic Glass Sliders, containing three sections each of ash, fustic, yew, pine, pseu, rice paper, elder, magnolia, horse chesnut, and pear. Grape vine, mangel wurzel, rose, one section each, in morocco case -                                                        | 0 18 0   |
| 27    | Small Glass Water Troughs, for viewing living Animalculæ - - - - - 1s. to                                                                                                                                                                                                                        | 0 4 0    |
| 28    | Micrometers on Glass, from 1-fiftieth to 1-thousandth of an inch - - - 1s. 6d. to                                                                                                                                                                                                                | 0 15 0   |
| 29    | A Dozen Lime Cylinders in sealed Bottle, for Hydro-Oxygen Light. Soft, 3s. 6d. Hard -                                                                                                                                                                                                            | 0 5 6    |
| 30    | Opaque or semi-transparent Screens (of Irish linen 9 feet wide) to any length; on roller, to shut up in a box - - - - - from 2l. to                                                                                                                                                              | 10 0 0   |
| <hr/> |                                                                                                                                                                                                                                                                                                  |          |
| 31    | Wollaston's Camera Lucida, for drawing Objects in True Perspective, in a small case for the pocket - - - - - 1l. 1s. to                                                                                                                                                                          | 2 12 0   |
| 32    | Improved Stands for ditto - - - - -                                                                                                                                                                                                                                                              | 1 10 0   |
| 33    | Amici's Camera Lucida - - - - -                                                                                                                                                                                                                                                                  | 2 12 6   |
| 34    | Glass Equilateral Prisms - - - 2s. to                                                                                                                                                                                                                                                            | 1 1 0    |
| 35    | Ditto, mounted on Brass Stand, with E. M. Clarke's arrangement of the Ball and Socket Joint, 1l. 10s. to                                                                                                                                                                                         | 2 10 0   |
| 36    | Sets of Glass Prisms, for demonstrating the Principles of the Achromatic Object-Glasses of Telescopes, Microscopes, &c. - - - - -                                                                                                                                                                | 0 18 0   |

## POLARISCOPES.

11

| NO.                                                                                                                                                                                                                    | £. s. d. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 37 Hollow Glass Prisms, with ground Stopper and movable parallel Glass Sides for experiments with Liquids of different refractive and dispersive powers - - - - -                                                      | 0 18 0   |
| 38 Claude Lorraine Glasses, for showing the effect of colour on pictures or real landscapes 1s. 6d. to                                                                                                                 | 0 15 0   |
| 39 Optical Diagonal machines for viewing perspective prints - - - - - 15s. to                                                                                                                                          | 2 2 0    |
| 40 Concave and Convex Silvered Glass Mirrors, mounted on stands with swing - 17. 1s. to                                                                                                                                | 2 2 0    |
| 41 Concave and Convex Silvered Glass Mirrors, in frames - - - - - 5s. 6d. to                                                                                                                                           | 10 0 0   |
| 42 Concave Silvered Glass Mirrors, ground cylindrically, for showing the deformation of objects reflected by this species of curved surface 15s. to                                                                    | 1 10 0   |
| 43 Silver mounted small Silvered Concave Mirror, for examining the interior of the mouth -                                                                                                                             | 0 17 6   |
| 44 Set of <i>three</i> Models, with the rays of light, represented by coloured silk strings, to illustrate the effects of vision; also the formation of the eye in its natural, long-sighted, and short-sighted states | 5 12 6   |
| 45 Set of <i>two</i> Models, with the rays of light represented by coloured silk strings to illustrate the principles of refracting and reflecting telescopes                                                          | 3 3 0    |
| 46 Set of <i>three</i> Models, with the rays of light represented by coloured silk strings to show the principles of the solar, compound, and simple microscopes - - - - -                                             | 3 10 0   |
| 47 Model to show the Decomposition of White Light by the Prism - - - - -                                                                                                                                               | 1 10 0   |
| 48 Apparatus to illustrate that the intensity of light is inversely as the square of the distance -                                                                                                                    | 1 0 0    |

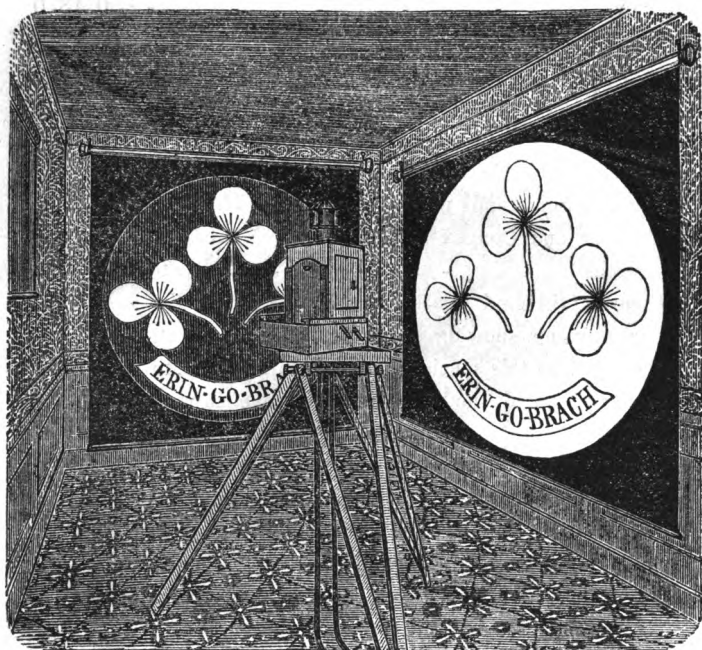
## POLARISCOPES.

- 1 GODDARD'S POLARISCOPE with analysing plates of mica or tourmaline, adapted to SOLAR or HYDRO-

NO.

£. s. d.

OXYGEN MICROSCOPES, for which the Inventor  
received the medal of the Society of Arts

*Fig. 4.*

E. M. Clarke respectfully informs the scientific public that he has been appointed by Mr. Goddard, sole manufacturer of this Polariscope, and that he is the only artist who has succeeded in constructing an instrument capable of fulfilling the scientific conceptions of the inventor. He can refer, with great satisfaction for proof of his ability to the instrument made by him for Mr. Goddard, by whom it was exhibited at the meeting of the British Association at Birmingham; it may now be seen three times a week, exhibited by the inventor at the Royal Gallery of Practical Science.

E. M. Clarke begs leave to take this opportunity of stating in reply to numerous enquiries on the subject, that a spurious and very imperfect imitation of Goddard's Polariscope has recently

been put forth under the pretence of cheapness. Its deficiencies, however, are apparent even on a slight examination; and these, when supplied by purchase, render it exorbitantly dear. It is but the ill-conceived and worse executed nucleus of the instrument, stripped of all its apparatus for the production of hydro-oxygen gas and light, consisting of the India rubber gas bags and flexible tubes of the same material, pressure boards, leaden retort, and glass purifier; iron retort and gun barrel, brass and pewter tubes, double tripod stand, Maugham's blowpipe and lime-light apparatus; a large and extensive class of *objects* and *accessories* (indispensable for the completion of the apparatus) are also omitted, to lay the unwary customer under the necessity of making additional purchases, viz. the sliders of various devices in thin films of selenite, arranged as "flowers, stars, fruits, and wedges," of various shaped figures of unannealed glass, sections of crystals and salts, mounted double-image prism, and analyzing plates of tourmaline and mica.

One object of such a mode of fabricating instruments appears to be, to tempt amateurs to make shift with separate portions of new, old and second-hand apparatus, which, perhaps, were never calculated to be connected — which cannot be safely used together, and which, therefore, no conscientious instrument-maker would induce individuals to attempt. It is only with the greatest attention to mechanical adaptation and good arrangement from the outset, that an apparatus for the safe combustion of the hydro-oxygen gases can be constructed, and it is only by the exertion of this systematic care and forethought in the formation of the entire instrument, that E. M. C. ventures to offer his arrangement to the public as safe, complete and effective in all its bearings.

NO.

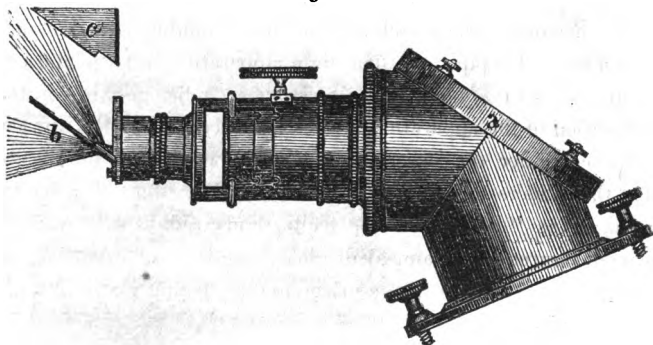
£. s. d.

2 Goddard's Hydro-Oxygen Polariscope, in a mahogany lantern, with sliding base on double tripod folding stand, as seen at *fig. 4.* with the pressure boards, *i k*; gas bags, *m n*; India rubber tubes 10 feet long each, *g h*, as seen at *fig. 1.* p. 5.: a

NO.

£. s. d.

modification of Daniell's and Maugham's Hydrogen-oxygen lime-light apparatus, hydrogen retort and purifier, as seen at *fig. 2.* p. 6.; cast-iron oxygen retort, winged coupler, gun barrel, brass and flexible pewter tubes. The Polariscopes (*fig. 5.*) has a moveable cap at *a*, which gives

*Fig. 5.*

great facility both for adjusting and cleaning the thin polarizing glass plates. The analyzing plates of mica at *b*, are also easily removed, and have perfect freedom of motion, both horizontally and vertically; the cap (*c*) to be used when the reflected rays are not wanted. The objects given with the apparatus consist of six sliders of selenite, viz. the shamrock, showing the national emblem of Ireland, in the two party colours, namely, green and orange, (originally designed by E. M. Clarke to exhibit in a polariscope made by him for an institution in Dublin), with motto on ribbon, "ERIN-GO-BRAGH," *fig. 4* p. 12; sixteen-ray superposing star, six-lozenge star, cube, crystalline formation of equal thickness, and film of unequal thickness, six slides of unannealed Glass in the following forms—square, round, oval, cross, concave rosette, convex rosette, six crystals mounted in brass to shew the colored rings, viz., nitre, arra-

| No. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | £. s. d. |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|     | gonite, borax, calcareous spar, quartz, topaz, three sliders of crystallized sulphate of magnesia, sulphate of soda, and acetate of zinc; E. M. Clarke's revolving selenite disc of uniform thickness, with band and pulley to rotate behind the selenite sliders and crystallization of salts; Goddard's screw-press arrangement for shewing the polarizing structure communicated to annealed glass by mechanical pressure; Goddard's arrangement for exhibiting the complementary colours by means of the double-image prism, and proving that when blended together they produce white light. Tourmaline analyzing plate, mounted in a brass cap, and Goddard's refracting and reflecting mica analysing plates, <i>b</i> , <i>fig.</i> 5, in a brass frame and cap | 30 0 0   |
| 3   | Ditto, ditto, on a larger scale                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 45 0 0   |
| 4   | Parties already furnished with a Gas Microscope, may have Goddard's Polariscopes added, including all the objects and analysing plates, complete, for                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 15 0 0   |
| 5   | Ditto ditto, larger size                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25 0 0   |
| 6   | Goddard's arrangement of a pair of double-image prisms, for shewing Huygen's experiment, and illustrating the polarization of light by double refraction; by means of which, a single beam of light is refracted into four distinct discs on the screen, showing their separation, and all the variations of intensity                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2 2 0    |
| 7   | Goddard's apparatus, for showing the double refracting structure communicated to glass by the transient influence of heat and cold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0 18 0   |
| 8   | E. M. Clarke's modification of ditto. In this arrangement, heat is communicated by the flame of a spirit lamp; in the former, by a heated iron bar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0 12 6   |
| 9   | Leeson's apparatus to show the above phenomenon, by the influence of cold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | - - -    |

| NO. |                                                                                                                                                                                                                                                                                                                                                       | £. s. d. |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 10  | E. M. Clarke's apparatus to show Brewster's experiment, see p. 236, fig. 120, Treatise on Optics, Lardner's Cyclopaedia; by this arrangement one glass bar rotates, which adds much to the interest of the experiment - - -                                                                                                                           | 1 10 0   |
| 11  | E. M. Clarke's arrangement of six of the above bars crossing each other, in two separate sliders of three bars each, the effect of which, either separate or combined, is very pleasing -                                                                                                                                                             | 0 10 0   |
| 12  | E. M. Clarke's dissected unannealed glass figures, to illustrate that the forms of the coloured bands are dependant on the external form of the glass -                                                                                                                                                                                               | 0 10 0   |
| 13  | E. M. Clarke's Slider, to show the polarizing structure of bladder - - -                                                                                                                                                                                                                                                                              | 0 5 0    |
| 14  | Quill Slider.—The varied colors of polarized light are beautifully developed by this interesting object -                                                                                                                                                                                                                                             | 0 5 0    |
| 15  | Goddard's apparatus for showing the phenomenon of polarized light on living aquatic insects -                                                                                                                                                                                                                                                         | 0 10 6   |
| 16  | Sliders, with fish fins, laminæ of human cuticle, ditto of nails, ditto of teeth, ditto of bones, preserved in Canadian balsam, to exhibit their polarizing structure - from 5s. to                                                                                                                                                                   | 0 15 0   |
| 17  | E. M. Clarke's design, in Selenite, of the Pansy ( <i>Pensée</i> ), with motto on coloured ribbon, "Heart's-ease," this is the only flower in which the change of colours harmonizes with nature - -                                                                                                                                                  | 1 1 0    |
| 18  | E. M. Clarke's design, in selenite, of the shamrock, with motto on a coloured ribbon, "Erin-go-bragh" —the films of selenite composing the leaves of the shamrock, are so arranged as to develope shamrock-green with its complementary colour, orange; being a harmonious combination of colours suitable to an exhibition before a mixed assembly - | 0 14 6   |
| 19  | Bunch of grapes in selenite, changing from yellow to purple - - - - -                                                                                                                                                                                                                                                                                 | 1 1 0    |
| 20  | Selenite design of the "Forget-me-not" with motto                                                                                                                                                                                                                                                                                                     |          |



| No. |                                                                                                                                                                                                                                                                                                                                                                                               | £. s. d. |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 21  | Selenite design of the Thistle with motto. -                                                                                                                                                                                                                                                                                                                                                  |          |
| 22  | Selenite figure of Harlequin. - - -                                                                                                                                                                                                                                                                                                                                                           |          |
| 23  | Ditto of Caspar - - -                                                                                                                                                                                                                                                                                                                                                                         |          |
| 24  | Ditto of Robin Hood - - -                                                                                                                                                                                                                                                                                                                                                                     |          |
| 25  | Ditto of Jim Crow, (black and white) -                                                                                                                                                                                                                                                                                                                                                        |          |
| 26  | Ditto of Sweep turned Baker, and vice versa. - - - -                                                                                                                                                                                                                                                                                                                                          |          |
| 27  | Goddard's selenite slider, to exhibit the Newtonian coloured rings. - - - -                                                                                                                                                                                                                                                                                                                   | 0 10 0   |
| 28  | Single selenite wedge, (thick at one edge), to show the coloured bands parallel to its edges. -                                                                                                                                                                                                                                                                                               | 0 7 6    |
| 29  | Double selenite wedge, (thin at both edges, thick in the middle), for ditto. - - - -                                                                                                                                                                                                                                                                                                          | 0 7 6    |
| 30  | E.M. Clarke's arrangement, to show that when two selenite wedges (double or single), are made to cross each other, and one to rotate, the coloured bands form diagonal bands to the square so formed                                                                                                                                                                                          | 1 10 0   |
| 31  | Selenite design of a gothic window £1 10s. to                                                                                                                                                                                                                                                                                                                                                 | 1 16 0   |
| 32  | E. M. Clarke's arrangement of selenite discs of uniform thickness, mounted in brass rings with band and pulley motion. The effect of these discs when placed in a polariscope, with groups of the various salts, aquatic insects, sections of bones and teeth, fish fins and scales, bladder, human cuticle and selenite designs, is greatly to increase the variations of the colours - each | 1 1 0    |
| 33  | Large plate of amethyst, cut perpendicular to the axis, exhibiting on an extensive scale the phenomenon described at p. 219, fig. 111, Treatise on Optics, Lardner's Cyclopaedia - -                                                                                                                                                                                                          | 0 12 6   |
| 34  | Sliders of groups of salts, viz. muriate of barytes, Glauber's-salt, sulphate of alumina, oxalic acid, Rochelle salt, nitrate of potassa, sulphate of iron, chloride of potassa, acetate of lead, sulphate of lime, Epsom salt - - each                                                                                                                                                       | 0 4 0    |

E. M. Clarke begs to state, that all the objects that have been mentioned, are fitted up expressly for Goddard's polariscope in proper mahogany frames, and fully protected from injury ; and that they are to be seen exhibited in a polariscope of E. M. Clarke's manufacture, three times a week, at two o'clock, at the Royal Gallery of Practical Science, Adelaide Street, by the Inventor, Mr. Goddard.

| no. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | £. s. d. |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 35  | By special appointment of the Inventor, Lieut.<br>Le Count's mirror polariscope. - -                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0 8 6    |
| 36  | Ditto, with dispersing plate, larger size. -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 12 0   |
| 37  | Ditto, ditto, portable, with spring fastening -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1 0 0    |
| 38  | Ditto, ditto, ditto, in rosewood -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1 5 0    |
| 39  | By appointment of the Inventor—Goddard's re-<br>flecting table Polariscope. This<br>Apparatus, with an Argand lamp<br>placed opposite the polarizing<br>bundle of glass ( <i>a</i> , <i>fig. 6.</i> ), ex-<br>hibits in the analyzing black<br>glass mirror ( <i>b</i> ) any polarizing<br>object placed at <i>c</i> . The analyz-<br>ing plate is movable in a horizon-<br>tal plane, and so simple is the<br>arrangement of both mirrors as<br>to render graduated quadrants<br>to adjust the angles quite unnne-<br>cessary - - . - | 2 2 0    |

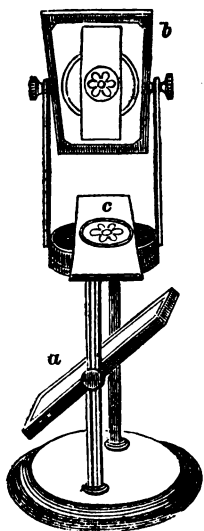


Fig. 6.

|    |                                                                                                                                                                            |        |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 40 | Tourmaline Polariscope mounted in king wood,<br>with the crystallized plates in a revolving wheel<br>so as to come within the tourmalines, which also<br>revolve - - - - - | 2 12 6 |
| 41 | Tourmaline Apparatus for showing the effect of                                                                                                                             |        |

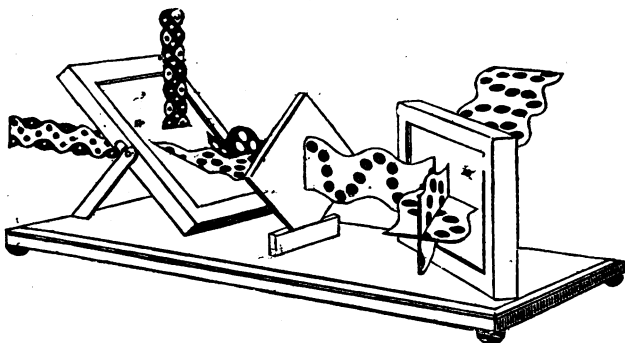
| No. |                                                                                                                                                                                                                                                        | £. s. d. |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|     | crystalline films on the coloured rings surrounding the optic axis - - - -                                                                                                                                                                             | 2 2 0    |
| 41  | Biot's black Mirror Polariscopes with socket and ball motion, and tripod stand, mounted in brass                                                                                                                                                       | 2 10 0   |
| 42  | Tourmaline Tong's Polariscopes - -                                                                                                                                                                                                                     | 0 15 0   |
| 43  | Professor Forbes' Pocket Mica Polariscopes -                                                                                                                                                                                                           | 0 10 0   |
| 44  | E. M. Clarke's Polarizing Kaloidoscope with tourmaline eye-piece. The objects consist of pieces of unannealed glass, figures and fragments of selenite, and configuration of various salts, in three separate cells - - - -                            | 1 10 0   |
| 45  | Ditto, with Glass Polarizing Plates - -                                                                                                                                                                                                                | 2 0 0    |
| 46  | Ditto ditto, on Stand - - - -                                                                                                                                                                                                                          | 2 10 0   |
| 47  | Polarizing Eye-pieces of thin plates of Glass; in Morocco leather cases - - 3s., 4s.; and                                                                                                                                                              | 0 5 0    |
| 48  | Tourmaline Eye-pieces and Plates of do. from 4s. to                                                                                                                                                                                                    | 5 0 0    |
| 49  | Goddard's Mica Analysing Plates - 1l. 1s. to                                                                                                                                                                                                           | 1 10 0   |
| 50  | Nicols's Single Image Prisms - - 6s. to                                                                                                                                                                                                                | 1 0 0    |
| 51  | Polarizing Plates of Papier Machie - 5s. to                                                                                                                                                                                                            | 1 10 0   |
| 52  | Ditto ditto, of black glass, per square inch -                                                                                                                                                                                                         | 0 1 6    |
| 53  | Ditto ditto, of thin flatted crown glass in black frames and velvet backs - - 6s. to                                                                                                                                                                   | 2 2 0    |
| 54  | Plate of Nitre, with four axis - - -                                                                                                                                                                                                                   | 0 5 0    |
| 55  | Ditto ditto, with two axis - - - -                                                                                                                                                                                                                     | 0 5 0    |
| 56  | Ditto Quartz of different thickness, right or left handed - - - - 3s. to                                                                                                                                                                               | 0 7 6    |
| 57  | Ditto Calc Spar - - - - 2s. to                                                                                                                                                                                                                         | 0 4 0    |
| 58  | Ditto Topaz - - - - -                                                                                                                                                                                                                                  | 0 6 0    |
| 59  | Rhombs of Iceland Spar - - 2s. to                                                                                                                                                                                                                      | 5 0 0    |
| 60  | Double refracting prisms of ditto - 8s. to                                                                                                                                                                                                             | 0 15 0   |
| 61  | Prisms of Calc Spar and Glass, in brass case -                                                                                                                                                                                                         | 0 14 6   |
| 62  | Goddard's Models for Illustrating the Polarization of Light by refraction and reflection from bundles of glass plates; with card models showing the planes of vibration; the depolarizing action of double-refracting crystals; the action of the ana- |          |

NO.

£. s. d.

lyzing part of the apparatus in the production of colours by interference, according to the undulatory theory. *Fig. 7.* - - -

2 12 6

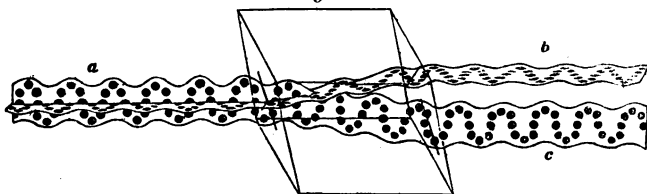
*Fig. 7.*

63 Goddard's Glass Model of Iceland Spar, for illustrating the polarization of light by double refraction on a stand. - - -

0 16 0

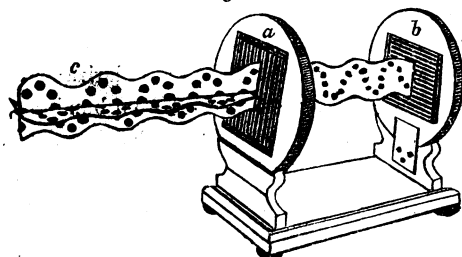
64 Ditto, in Mahogany box to shape - - -

1 5 0

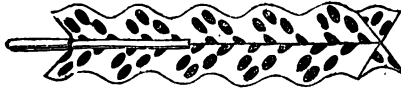
*Fig. 8.*

65 Goddard's model to explain the action of two tourmaline plates in polarizing light. *fig 9* -

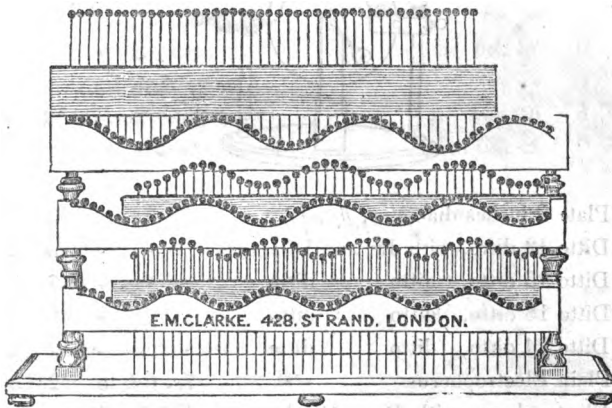
1 1 0

*Fig. 9.*

- |     |                                                                                                      |    |    |     |
|-----|------------------------------------------------------------------------------------------------------|----|----|-----|
| NO. |                                                                                                      | £. | s. | d.  |
| 66  | Goddard's Card Model of a Ray of ordinary Light showing its two planes of vibration, <i>fig. 10.</i> | -  | 0  | 5 0 |

*Fig. 10.*

- |    |                                                                                                                                                                                                                                              |   |   |       |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------|
| 67 | Woodward's Model for illustrating the Undulatory Theory of Light, showing different waves constituting the three primitive colours; also the effects of interference of undulations and production of complementary colours, <i>fig. 11.</i> | - | - | 4 4 0 |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------|

*Fig. 11.*

- |    |                                                                                                                                                 |   |   |        |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--------|
| 68 | Professor Powell's Apparatus to exhibit plain, circular, and elliptical vibrations. The cranks in this arrangement are dispensed with. One wave |   |   |        |
|    | 3 <i>l.</i> 13 <i>s.</i> 6 <i>d.</i> , two waves                                                                                                | - | - | 4 10 0 |

## APPARATUS FOR FRICTIONAL ELECTRICITY.

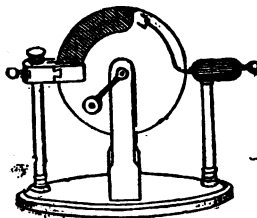
- |   |                                                         |   |   |   |                             |        |
|---|---------------------------------------------------------|---|---|---|-----------------------------|--------|
| 1 | Cylinder electrical machines, for experimental purposes | - | - | - | 2 <i>l.</i> 10 <i>s.</i> to | 10 0 0 |
|---|---------------------------------------------------------|---|---|---|-----------------------------|--------|

| NO. |                                                                                           | £. s. d. |
|-----|-------------------------------------------------------------------------------------------|----------|
| 2   | Ditto, with positive and negative conductors, 6l. to                                      | 50 0 0   |
| 3   | Cylinder machines, with apparatus, for medical use,<br>packed in a case - - - 3l. 10s. to | 20 0 0   |

E. M. Clarke's arrangement of the Plate Glass Electrical Machine whereby positive and negative electricity can be obtained without the usual expense attendant on such machines. Each machine has two separate conductors for positive and negative electricity. The largest Plate Electrical Machine in the world has been made by E. M. Clarke (the size of the plate being 7 feet diameter) on this construction.

NO. £. s. d.

*Fig. 12.*



|    |                                                                                                                                                                                                       |   |        |                  |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------|------------------|
| 4  | Plate 9 inches diameter, <i>fig. 12.</i>                                                                                                                                                              | - | -      | 3 3 0            |
| 4  | Ditto 12 ditto, with Jar and Director                                                                                                                                                                 | - | -      | 5 5 0            |
| 5  | Ditto 15 ditto, ditto ditto                                                                                                                                                                           | - | -      | 7 7 0            |
| 6  | Ditto 18 ditto, ditto ditto                                                                                                                                                                           | - | -      | 9 9 0            |
| 7  | Ditto 24 ditto, ditto ditto                                                                                                                                                                           | - | -      | 12 12 0          |
| 8  | Plain Electrophorus                                                                                                                                                                                   | - | -      | 7s. 6d. to 2 5 0 |
| 9  | Electrophorus with Brass Conductor and Jointed Lever, for lifting the upper plate rapidly, so that a Leyden phial may be readily charged. This instrument is well adapted for the chemical laboratory | - | -      | 1 10 0           |
| 10 | Ditto, to shut in a cabinet, by which the resinous plate is not exposed to dust, &c,                                                                                                                  | - | -      | 2 5 0            |
| 11 | Small Leyden Phials                                                                                                                                                                                   | - | 2s. to | 0 5 0            |
| 12 | Open Mouthed Leyden Jars                                                                                                                                                                              | - | 4s. to | 1 10 0           |
| 13 | Medical Jars                                                                                                                                                                                          | - | 6s. to | 0 18 0           |

| NO. |                                                                                                          | £. s. d. |
|-----|----------------------------------------------------------------------------------------------------------|----------|
| 14  | Electrical Jars, with moveable coatings, 7s. 6d. to                                                      | 0 16 0   |
| 15  | Ditto ditto, with spotted and diamond coatings, in<br>a great variety of patterns - - - 6s. to           | 1 10 0   |
| 16  | Ditto, to explain the Franklinian theory, 15s. to                                                        | 1 1 0    |
| 17  | Harris's Unit Jar - - - - -                                                                              | -        |
| 18  | Electrical Jars, mounted in any number, to form<br>batteries, on the most approved principles, 1l. to    | 20 0 0   |
| 19  | Square plates of Glass, coated on each side, on<br>stands - - - - - 7s. 6d. to                           | 1 1 0    |
| 20  | Ditto mounted in batteries - - - 15s. to                                                                 | 5 0 0    |
| 21  | Electric See-saw apparatus - - -                                                                         | 0 15 0   |
| 22  | Electric Stand for Eggs, Oranges, &c., 7s. 6d. to                                                        | 0 15 0   |
| 23  | Electric Fly and Point - - - - -                                                                         | 0 4 0    |
| 24  | Electric Inclined Plane - - - - -                                                                        | 1 1 0    |
| 25  | Electrical Planetarium - - - 8s. to                                                                      | 1 4 0    |
| 26  | Electrical Bucket - - - 3s. 6d. to                                                                       | 0 7 6    |
| 27  | Electrical Sportsman - - - - -                                                                           | 1 5 0    |
| 28  | Electrical Fire-house - - - 16s. to                                                                      | 1 10 0   |
| 29  | Electrical Thunder-house - - - 7s. 6d. to                                                                | 0 18 0   |
| 30  | Electrical Obelisk - - - - -                                                                             | 0 11 0   |
| 31  | Electrical Pistol - - - 7s. 6d. to                                                                       | 1 5 0    |
| 32  | Electrical Bells - - - 10s. 6d. to                                                                       | 1 1 0    |
| 33  | Set of Eight Bells, or the Gamut, played by the<br>Electric Fly - - - 1l. 16s. to                        | 2 10 0   |
| 34  | Apparatus to electrify the eye - - -                                                                     | 0 6 6    |
| 35  | Ditto the Ear - - - - -                                                                                  | 0 6 6    |
| 36  | Brass Cannon for firing gas - - -                                                                        | 0 12 0   |
| 37  | Ditto, on wheels - - - - -                                                                               | 0 18 0   |
| 38  | Ditto, for firing gunpowder - - - 6s. to                                                                 | 0 15 0   |
| 39  | Aurora Flask - - - 7s. 6d. to                                                                            | 0 18 0   |
| 40  | Luminous Conductors, - - - 18s. to                                                                       | 2 2 0    |
| 41  | Falling-Star Apparatus - - - 18s. to                                                                     | 1 5 0    |
| 42  | Glass Globe, with Sliding Rods and Stop Cock,<br>for experiments on electric light in vacuo, 1l. 15s. to | 1 11 6   |
| 43  | Pair of Brass Plates, with Stand to show the danc-<br>ing figures - - - - -                              | 0 13 0   |
| 44  | Pith Ball Stand - - - - -                                                                                | 0 6 6    |

| NO. |                                                                                                                                                                                                                                      | £. s. d. |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 45  | Working Card Models, of a Corn-mill, a three-barrelled Pump, and an Orrery, each - -                                                                                                                                                 | 0 15 0   |
| 46  | Artificial Spider - - -                                                                                                                                                                                                              | 0 2 0    |
| 47  | Carved Head, with Hair - - 7 <i>s.</i> 6 <i>d.</i> to                                                                                                                                                                                | 0 15 0   |
| 48  | Spangled Glass Tubes - - - 5 <i>s.</i> 6 <i>d.</i> to                                                                                                                                                                                | 0 12 0   |
| 49  | Five ditto, on Mahogany Stand - 1 <i>l.</i> 8 <i>s.</i> to                                                                                                                                                                           | 2 10 0   |
| 50  | One ditto, ditto, with Electric Fly -                                                                                                                                                                                                | 0 13 0   |
| 51  | Spangled Glass Plate, on Stand -                                                                                                                                                                                                     | 0 13 0   |
| 52  | Luminous Electrical Word, on Glass Plate -                                                                                                                                                                                           | 0 10 6   |
| 53  | Luminous Conductor, with bent Glass Tube and Iron Chain - - - 10 <i>s.</i> 6 <i>d.</i> to                                                                                                                                            | 0 15 0   |
| 54  | Glass Plate, on Stand, to show the charging and discharging of the Electrical Shock in a pleasing manner - - - 18 <i>s.</i> to                                                                                                       | 1 10 0   |
| 55  | Brass Cylindrical Conductors, insulated with Pith Balls, to show Electric Induction - 5 <i>s.</i> 6 <i>d.</i> to                                                                                                                     | 0 16 0   |
| 56  | Electrical Condenser for showing the presence of innate quantities of Electricity by the Electrometer                                                                                                                                | 0 18 0   |
| 57  | Brass Stands to show Attraction and Repulsion, 8 <i>s.</i> to                                                                                                                                                                        |          |
| 58  | A Pair of Directors, with wooden points, 7 <i>s.</i> 6 <i>d.</i> to                                                                                                                                                                  | 0 10 6   |
| 59  | Coated Jar, with Electrometer - 12 <i>s.</i> to                                                                                                                                                                                      | 1 4 0    |
| 60  | Insulated Stools - - - 9 <i>s.</i> to                                                                                                                                                                                                | 3 3 0    |
| 61  | Ditto chairs, different constructions 3 <i>l.</i> 13 <i>s.</i> 6 <i>d.</i> to                                                                                                                                                        | 5 5 0    |
| 62  | Cavallo's Pith Ball Electroscope, for atmospheric electricity - - - 15 <i>s.</i> to                                                                                                                                                  | 1 15 0   |
| 63  | Ditto, Pocket Electroscope - 7 <i>s.</i> 6 <i>d.</i> to                                                                                                                                                                              | 0 18 0   |
| 64  | Bennet's Gold-Leaf Electroscope - -                                                                                                                                                                                                  | 1 1 0    |
| 65  | Singer's Gold-Leaf Electroscope, improved by E.M. Clarke - - -                                                                                                                                                                       | 0 15 0   |
| 66  | Ditto, with parallel condensing plates - -                                                                                                                                                                                           | 2 0 0    |
| 67  | Ditto, large size, for the lecture table. The gold leaves are suspended in a spherical glass, and is the most delicate instrument yet invented. The leaves diverge by magnetic electricity (see Leit-head on electricity, p. 7.) - - | 2 12 6   |
| 68  | Häüy's Needle Electroscope - - - 5 <i>s.</i> to                                                                                                                                                                                      | 0 7 6    |



| NO. |                                                                                                                     | £. s. d. |
|-----|---------------------------------------------------------------------------------------------------------------------|----------|
| 69  | Faraday's Glass Thread Electroscope - -                                                                             | 1 1 0    |
| 70  | Henley's Quadrant Electrometer - 6s. to                                                                             | 1 10 0   |
| 71  | Medical Electrometer - - 5s. to                                                                                     | 0 10 0   |
| 72  | Coulomb's torsion Electrometer - -                                                                                  | 2 0 0    |
| 73  | Cuthbertson's Grain Weight Discharging Electrometer - - -                                                           | 2 5 0    |
| 74  | Lane's Discharging Electrometer - -                                                                                 | 0 6 8    |
| 75  | Harris's Discharging Electrometer - 1l. 5s. to                                                                      | 2 2 0    |
| 76  | Ditto, Electrical Balance - -                                                                                       | -        |
| 77  | Henley's Universal Discharger and Press, 1l. 10s. to                                                                | 3 3 0    |
| 78  | Apparatus to show the instantaneousness of Electrical Light, by decomposing the white ray, 1l. 5s. to               | 3 13 6   |
| 79  | Barker's Rotating Spangled Plates - 10s. to                                                                         | 1 10 0   |
| 80  | Barker's atmospheric Electrometer. This is the most delicate indicator and measurer of electricity yet known - - -  | -        |
| 81  | Barker's Electrical Flask Experiment - -                                                                            | -        |
| 82  | Insulated Stands, for suspending Pith or Card Balls                                                                 | -        |
| 83  | Electrical Condenser - - -                                                                                          | 5 10 0   |
| 84  | Insulated Conductors, with Pith Balls, for experiments on Induction - - 3s. 6d. to                                  | 0 10 0   |
| 85  | Cannon, on Pedestal, with Electrophorus and Hydrogen Generator, to explode with the electric spark - - -            | 4 14 6   |
| 86  | Birt's Apparatus, to show the distribution and transfer of Electricity - - 1l. 1s. to                               | 2 5 0    |
| 87  | Birt's Apparatus, to show the decrease of intensity, by the increase of surface, and vice versâ, 1l. 10s. to        | 2 10 0   |
| 88  | Lullin's Apparatus, - 10s. to                                                                                       | 1 1 0    |
| 89  | Ivory Bomb, to project a ball, by passing a shock through a drop of water, oil, ether, or fulminating mercury - - - | 0 10 0   |
| 90  | Brass, Ivory, Bone, Baked Wood, and Pith Balls                                                                      | -        |
| 91  | Pith and Paper Figures - - -                                                                                        | -        |
| 92  | Glass Plumes, for electrical repulsion 2s. 6d. to                                                                   | 0 15 0   |
| 93  | Amalgam, TinFoil, Brass and Iron Chain, &c. -                                                                       | -        |

## ELECTRO-CHEMICAL, OR VOLTAIC APPARATUS.

| NO. |                                                                                                                                                  | £. | s. | d. |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
| 1   | Volta's pile of 50 zinc and 50 copper plates, soldered together, size of a penny, on mahogany stand - - - - -                                    | 0  | 15 | 0  |
| 2   | Pairs of Zinc and Copper Plates, soldered together, size of a dollar, per dozen - - - - -                                                        | 0  | 4  | 0  |
| 3   | Ditto, size of a penny - - - - -                                                                                                                 | 0  | 2  | 6  |
| 4   | Silver and Zinc Wires, soldered together, for Volta's Courrone de Tasses, per dozen - - - - -                                                    | 0  | 7  | 0  |
| 5   | Pair of circular Zinc and Copper Plates, with glass handles for showing electricity by contact - - - - -                                         | 0  | 10 | 0  |
| 6   | Wollaston's Battery, 12 pair of zinc and double copper plates, in Wedgwood-ware troughs - - - - -                                                | 2  | 0  | 0  |
| 7   | Cruikshank's Battery, 50 pair 4 inch plates - - - - -                                                                                            | 4  | 0  | 0  |
| 8   | Ditto 3 ditto - - - - -                                                                                                                          | 3  | 0  | 0  |
| 9   | Ditto 2½ ditto - - - - -                                                                                                                         | 2  | 0  | 0  |
| 10  | Ditto 1½ ditto - - - - -                                                                                                                         | 1  | 5  | 0  |
| 11  | Cylindrical Batteries - - - 5s. to - - - - -                                                                                                     | 1  | 1  | 0  |
| 12  | E. M. Clarke's Square Box Battery, the most powerful arrangement when a sudden but short flow of Electricity is required - - - 10s. to - - - - - | 2  | 0  | 0  |
| 13  | Professor Hare's Calorimotor, in all its various arrangements of spiral and flat plates - 15s. to - - - - -                                      | 12 | 12 | 0  |
| 14  | Daniell's Elementary Battery - - - - -                                                                                                           | 1  | 15 | 0  |
| 15  | Ditto, Dissected Battery - - - 6l. to - - - - -                                                                                                  | 12 | 0  | 0  |
| 16  | Ditto, Constant Battery, a series of 10 - - - - -                                                                                                | 5  | 10 | 0  |
| 17  | Shillibeer's Sustaining Voltaic Battery and Pole Director - - - - -                                                                              | 0  | 17 | 0  |
| 18  | Ditto, combined in any number - - - - -                                                                                                          |    |    |    |
| 19  | Leithead's Pocket Battery - - - - -                                                                                                              | 0  | 5  | 0  |

The following Batteries I can strongly recommend as being superior to all the foregoing, owing to their better mechanical arrangement. In principle, they are the same as Professor Daniell's, with the exception of the rejection of acid altogether,

and the single pair for Electro-magnetic purposes, not requiring mercury as I make the connexion by my binding screws. When arranged in boxes, by my contrivance, you can connect the zinc and copper plates or cylinders alternately, in two seconds of time; thus having a Voltaic or Intensity arrangement, or the zinc plates can all be connected, so as to form but one plate. The copper plates can be similarly connected, thus forming a Calorimotor.

| NO.                                                                                                                                                                                                                                                                                                                                                                                                                    | £. s. d. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 20 One pint Electro-chemical Battery in porcelain jar,<br>with E. M. Clarke's binding screw connexions -                                                                                                                                                                                                                                                                                                               | 0 6 6    |
| 21 Three pint Ditto - - - -                                                                                                                                                                                                                                                                                                                                                                                            | 0 10 6   |
| 22 Six one-pint jars, in box, with E. M. Clarke's<br>arrangement for obtaining quantity or intensity -                                                                                                                                                                                                                                                                                                                 | 2 2 0    |
| 23 Ten 1-pint ditto - - - -                                                                                                                                                                                                                                                                                                                                                                                            | 3 10 0   |
| 24 Ten 3-pint ditto, (this is the best size) - -                                                                                                                                                                                                                                                                                                                                                                       | 5 15 6   |
| 25 Four boxes of the above - - - -                                                                                                                                                                                                                                                                                                                                                                                     | 22 0 0   |
| 26 Grove's Platina Voltaic Battery, each - 4s. to                                                                                                                                                                                                                                                                                                                                                                      | 2 2 0    |
| 27 E. M. Clarke begs to state that he has just completed an arrangement of an Electro-Chemical Battery, which is unquestionably the most powerful and convenient yet constructed. The metals employed are silver and an amalgum of zinc and mercury: the exciting liquids—nitrate of silver and muriate of ammonia. Each pair of elements stand in a separate glass vessel with insulating stem and foot, each - - - - | 0 10 0   |
| 28 Zamboni's Electric Pile of zinc, Manganese, and Honey. These are much more powerful than the dry pile of De Luc - - - -                                                                                                                                                                                                                                                                                             | 0 12 6   |
| 29 Cabinet containing a number of the above, which keep a metallic disc in a constant reciprocating motion, under a glass shade - - - -                                                                                                                                                                                                                                                                                | 3 13 6   |
| 30 Ditto, ditto, which keep a butterfly hovering over alternately two vases of flowers, under a glass shade - - - -                                                                                                                                                                                                                                                                                                    | 5 5 0    |

| NO.                                                                                                                                           | £. s. d. |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 31 Ditto, ditto, much larger size, representing four cupids chasing each other and playing at the game of Jeu de Bague, under a glass shade - | 12 12 0  |
| 32 Universal Discharger, with Forceps to hold charcoal points - - - -                                                                         | 1 12 0   |
| 33 De Luc's Electric Column, or Dry Pile, 17.11s.6d.to                                                                                        | 6 6 0    |
| 34 Glass Apparatus for experiments on the decomposition of neutral salts - - 10s. 6d. to                                                      | 1 1 0    |
| 35 Pepy's Apparatus for decomposing the alkaline substances - - - -                                                                           | 1 11 6   |
| 36 Pair of Platinum square Plates, on Glass Columns, for the decomposition of the alkalies, by chemical Electricity - - - 17. 10s. to         | 3 3 0    |
| 37 Glass Globe, with Stop Cock, Brass ground Plate, and Collar of Leather, with sliding Forceps for showing electrical light in vacuo - -     | 1 16 0   |
| 38 E. M. Clarke's arrangement of the Decomposition of Water Apparatus, 2 inches diameter -                                                    | 0 10 6   |
| 39 Ditto, 4 inches - - - -                                                                                                                    | 1 5 0    |
| 40 Ditto, 7 inches - - - -                                                                                                                    | 1 15 0   |
| 41 Ditto, 12 inches - - - -                                                                                                                   | 4 4 0    |
| 42 E. M. Clarke's Improvement of Faraday's Voltameter - - - -                                                                                 | 1 10 0   |
| 43 Ditto Thermo-Voltameter - - - -                                                                                                            | 2 10 0   |
| 44 Books of Gold and Silver Leaf and Reels of Wires for Combustion.                                                                           | .        |
| 45 Compound Chains of different Metallic Wires to show their relative conducting powers.                                                      |          |

## ELECTRO-MAGNETIC INSTRUMENTS.

- 1 Apparatus to show Ørsted's Experiment of the deflection of the magnetic needle by a wire transmitting an electrical current above and below it 0 10 6
- 2 E. M. Clarke's arrangement of Ørsted's Experiment, possessing all the advantages of the electric

NO.

£. s. d.

current passing above and below the needle, showing the dip, &c., but in a much simpler form -

1 4 0

3 E. M. Clarke's Electrepeter. This instrument

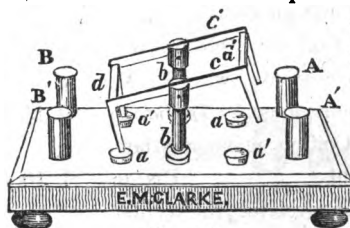


Fig. 13.

changes in a moment the direction of Voltaic currents, or totally stops their passage, without the necessity as heretofore of removing and re-arranging the conducting wires by hand. To Lecturers this instrument is of great utility, enabling them to show with rapidity and precision the changes that take place in the directions of electro-magnetic motions, *fig. 13.*

0 15 0

4 Magnetizing Helix, on Iron Cylinder, to show the production of magnetism in iron by a voltaic current. When in connexion with the electrepeter the poles placed are readily changed. Two magnetic needles being at each end, by turning the charges a continuous rotation may be produced

0 2 6

5 Vertical Helix on Stand to show Mrs. Somerville's experiment of the suspension of a steel sewing needle within the coil

0 12 6

6 Magnetizing Helix on glass tube - 6d. to

0 1 6

7 Soft Iron Voltaic Magnet with armature -

0 3 6

8 Ditto ditto, with two coils of covered wire -

0 5 0

9 Ditto ditto, with two coils condensed at the poles

0 7 6

10 Ditto ditto, with four coils -

0 15 0

11 Ditto ditto, with four coils condensed at the poles

0 18 0

12 Ditto ditto, with four coils 20 yards each, and

E. M. Clarke's binding screw connexions -

1 5 0

13 Ditto ditto, with six coils 20 yards each, ditto -

2 2 0

14 Professor Henry's Electro-magnet with oval sus-

| No. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | £. s. d. |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|     | pension collar to armature. This is the most powerful arrangement - - - 5 <i>l.</i> 5 <i>s.</i> to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 12 12 0  |
| 15  | Triangle Stands for Voltaic Magnets 10 <i>s.</i> to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1 10 0   |
| 16  | Professor Henry's Lever Stand for ditto -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |          |
| 17  | Professor Callan's Helical Coil on a hollow reel for primary and secondary currents, with E. M. Clarke's binding screw connexions - 7 <i>s.</i> 6 <i>d.</i> to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0 15 0   |
| 18  | Professor Callan's Helical Coil on mahogany bottom board, more convenient - 10 <i>s.</i> to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1 10 0   |
| 19  | Professor Callan's Coil with revolving interceptor for medical purposes - - -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2 12 6   |
| 20  | Ditto, ditto, with a pair of conductors, sponge directors, electro-chemical-battery, sulphate of copper in jar, muriate of ammonia, in lock-up-case, for medical purposes - - -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4 4 0    |
| 21  | Lockey's Electro-magnetic-Machine, consisting of a large Callan's Coil, with Lockey's arrangement for breaking battery contact. A continuous circle of voltaic light is produced, the colour of which depends on the description of metallic circle and spring that is undergoing combustion. By E. M. Clarke's arrangement, the brilliant combustion of mercury is also shown. The shocks from the secondary current are the most powerful yet produced. The machine has a lock-up cover and cupboard which contain five metallic circles and five springs, viz.: copper, brass, tin, lead, and zinc; a pair of conductors, mercury cup, and star, complete, <i>fig.</i> 14. - - - | 5 5 0    |
| 22  | E. M. Clarke's arrangement of Ritchie's Rotating Voltaic Magnet for ditto - - -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0 10 0   |
| 23  | E. M. Clarke's arrangement of Ritchie's Rotating Wire Cage for ditto - - -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0 7 6    |

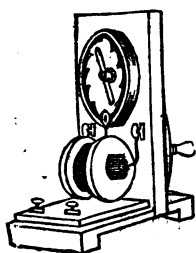
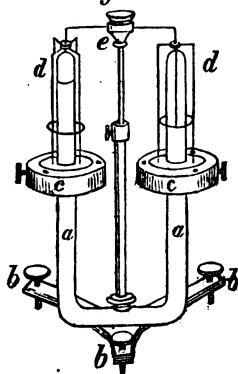


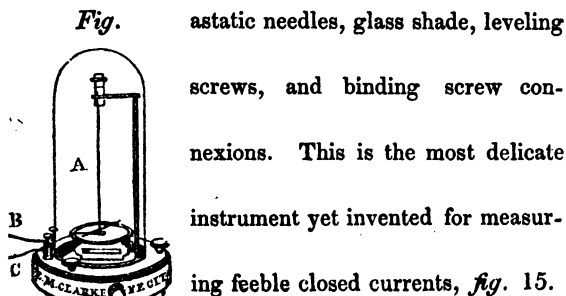
Fig. 14.

| NO. |                                                                                                                                  | £. | s. | d. |
|-----|----------------------------------------------------------------------------------------------------------------------------------|----|----|----|
| 24  | E. M. Clarke's Arrangement of the Vertical Cylindrical Magnet, with flood cups, leveling screws on tripod stand, <i>fig.</i> 15. | 1  | 10 | 0  |

*Fig. 15.*

|    |                                                                                                                                     |             |   |    |   |
|----|-------------------------------------------------------------------------------------------------------------------------------------|-------------|---|----|---|
| 25 | Mobile Wire Frames to rotate by voltaic, magnetic, and thermo-electricity for ditto                                                 | -           | 0 | 5  | 0 |
| 26 | Ampere's Apparatus to show the rotation of the battery round the magnet for ditto                                                   | -           | 0 | 10 | 0 |
| 27 | Pair of fixed circular Troughs with Mobile zinc leaves to show rotation for one metal, for ditto                                    | -           | 0 | 12 | 6 |
| 28 | Pair of Helical Coils on Reels with E. M. Clarke's binding screw connexions to show the deflection of the magnetic needle for ditto | -           | 0 | 15 | 0 |
| 29 | The above Instruments packed in mahogany cabinet with lock and key                                                                  | -           | 5 | 17 | 0 |
| 30 | Ritchie's Rotating Voltaic Magnet                                                                                                   | -           | 0 | 5  | 6 |
| 31 | Ditto, with soft iron horse-shoe                                                                                                    | -           | 0 | 10 | 6 |
| 32 | Ditto, to rotate by terrestrial magnetism                                                                                           | -           | 0 | 10 | 6 |
| 33 | Ritchie's Rotating Voltaic Magnet, with steel horse-shoe magnet                                                                     | -           | 1 | 1  | 0 |
| 34 | Ditto, within two bent bar magnets                                                                                                  | 17. 10s. to | 2 | 0  | 0 |
| 35 | Ditto ditto, with Lockey's Interceptor                                                                                              | -           | 1 | 15 | 0 |
| 36 | Ditto ditto, with Page's silver segments                                                                                            | -           | 2 | 2  | 0 |

| NO. |                                                                                                                                                                                                                                       | £. s. d. |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 37  | Page's Rotatory Multiplier. (See "Silliman's Journal," vol. xxxiii. no. 2. p. 376.) -                                                                                                                                                 | 2 2 0    |
| 38  | Page's Rotatory Wire Coil. (See "Silliman's Journal," vol. xxxiii. no. 1. p. 191. fig. 1.) -                                                                                                                                          | 2 2 0    |
| 39  | Page's Rotatory Electro-Dynamic Cylinder, to fit the above - - - -                                                                                                                                                                    | 0 15 0   |
| 40  | E. M. Clarke's Electro-Magnetic Drilling Machine                                                                                                                                                                                      | 3 3 0    |
| 41  | Ditto Electro-Magnetic Machine, for working a water pump - - - -                                                                                                                                                                      | 4 4 0    |
| 42  | Ditto Electro-Magnetic Machine, for playing a musical snuff box - - - -                                                                                                                                                               | 8 10 0   |
| 43  | Saxton's arrangement of a horizontal voltaic magnet, having a permanent bar magnet rotating vertically at the poles, with Page's silver segments in lieu of the mercury cup, and Callan's secondary coils to give powerful shocks - - | 5 5 0    |
| 44  | Ditto as originally constructed by Mr. Saxton -                                                                                                                                                                                       | 3 10 0   |
| 45  | Professor Henry's Reciprocating Electro-Magnetic Beam. This apparatus answers for breaking battery contact so as to give shocks - 1 <i>l.</i> 1 <i>s.</i> to                                                                          | 4 4 0    |
| 46  | Cummins's Galvanoscope - - 7 <i>s.</i> 6 <i>d.</i> to                                                                                                                                                                                 | 0 10 0   |
| 47  | Ditto, with leveling screws and glass plate -                                                                                                                                                                                         | 0 17 6   |
| 48  | Ditto, improved by Collingwood, with arched glass                                                                                                                                                                                     | 2 10 0   |
| 49  | Faraday's Galvanoscope with astatic needles, leveling screws, and glass shade - - -                                                                                                                                                   | 2 0 0    |
| 50  | Melloni's Galvanoscope with moveable coil and                                                                                                                                                                                         |          |



5 5 0



| NO. |                                                                                                                                                                                                                          | £. s. d. |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 51  | E. M. Clarke's arrangement of the apparatus to show the rotation of magnets round a vertical wire having an ascending or descending current                                                                              | 1 0 0    |
| 52  | E. M. Clarke's arrangement of the magnet rotating on its axis - - - -                                                                                                                                                    | 1 0 0    |
| 53  | Verticle rotating Voltaic Bar Magnet - -                                                                                                                                                                                 | 1 5 0    |
| 54  | E. M. Clarke's arrangement of Faraday's wire, rotating round the poles of a Magnet - -                                                                                                                                   | 0 10 6   |
| 55  | Marshe's Vibrating Wire - -                                                                                                                                                                                              | 0 5 6    |
| 56  | Barlow's rotating Star or Disc - -                                                                                                                                                                                       | 0 18 0   |
| 57  | Ditto larger size - - -                                                                                                                                                                                                  | 1 5 0    |
| 58  | E. M. Clarke's arrangement of Ampere's suspended wire frame, to show the attraction and repulsion of Voltaic and Magnetic currents - -                                                                                   | 0 17 6   |
| 59  | E. M. Clarke's fixed vertical wire frame. This apparatus when attached to the Electrepeter, and in a parallel plane with the above, exhibits in a striking manner the attraction and repulsion of Voltaic currents - - - | 0 16 0   |
| 60  | Suspended Voltaic Helix - - -                                                                                                                                                                                            | 0 16 0   |
| 61  | Suspended Voltaic Spiral - - -                                                                                                                                                                                           | 0 16 6   |
| 62  | Suspended double Voltaic Spiral - -                                                                                                                                                                                      | 1 10 0   |
| 63  | Ritchie's rotating Voltaic Frame - -                                                                                                                                                                                     | 1 4 0    |
| 64  | De la Rive's Floating Battery - -                                                                                                                                                                                        | 0 3 0    |
| 65  | Marsh's arrangement of ditto - -                                                                                                                                                                                         | 0 5 0    |
| 66  | E. M. Clarke's arrangement of ditto, being much lighter, and consequently more active -                                                                                                                                  | 0 6 6    |
| 67  | Ditto, with a Helical Coil - - -                                                                                                                                                                                         | 0 6 6    |
| 68  | Barlow's Apparatus to illustrate terrestrial magnetism, iron globe 9 inches diameter -                                                                                                                                   | 3 15 0   |
| 69  | Ditto, ditto, iron globe 12 inches diameter -                                                                                                                                                                            | 5 0 0    |
| 70  | Professor Henry's Voltaic thermo-electric multiplying copper ribbon coil - - - 10s. to                                                                                                                                   | 1 1 0    |
| 71  | Ditto ditto, for giving secondary shocks from a single galvanic pair - - - 17. 10s. to                                                                                                                                   | 3 3 0    |

| NO. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | £. s. d. |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 72  | Dr. Roget's crosses of Ivory for showing the direction of electro-magnetic currents - -                                                                                                                                                                                                                                                                                                                                                                                                                              | 0 3 6    |
| 73  | Dolls for ditto - - 1s. to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 2 6    |
| 74  | E. M. Clarke's Electro-magnetic Cabinet, containing two cylindrical bar magnets with armatures; an electro-chemical battery; Hare's spiral calorimeter; Ampère's cylindrical voltaic battery; mobile wire frame; Ritchie's rotating voltaic magnet: Callan's wire coil; Cummins's galvanometer; voltaic magnet and armature; insulated wire helix; De la Rive's floating battery; thermometer of copper and platina wire; platina wire apparatus; securely packed in a neat mahogany cabinet, with lock and key .. - | 5 5 0    |
| 75  | English copper wire covered with cotton or silk, for electro-magnetic experiments from 2s. 4d. $\frac{1}{2}$ lb - - - - - to                                                                                                                                                                                                                                                                                                                                                                                         | 0 15 0   |
| 76  | German copper wire covered with cotton or silk, this wire is far superior to that made of English copper, softer and more flexible, and a better electrical conductor, from 6s. 6d. $\frac{1}{2}$ lb to                                                                                                                                                                                                                                                                                                              | 1 5 0    |

## THERMO-ELECTRICAL INSTRUMENTS.

|   |                                                                                                   |        |
|---|---------------------------------------------------------------------------------------------------|--------|
| 1 | Seebeck's compound frame for thermo-electricity -                                                 | 0 9 0  |
| 2 | Bar of Bismuth and Antimony on stand, so as to allow heat to be applied without fear of breaking  | 0 17 0 |
| 3 | Ditto, without stand - - -                                                                        | 0 7 0  |
| 4 | Rectangular Frame of Bismuth and Copper with magnetic needle - - -                                | 0 9 0  |
| 5 | Ditto, on tripod stand with leveling screws to admit of giving a horizontal motion to the frame - | 0 15 0 |
| 6 | Thermomotors of Silver and Platina, 2s. 6d. to                                                    | 0 15 0 |
| 7 | Ditto Bismuth and Platina, 5s. to                                                                 | 0 12 6 |
| 8 | Compound Frame of Copper and Zinc, terminating in flat spiral coil on stand and needle -          | 0 15 0 |

MAGNETIC ELECTRICAL INSTRUMENTS.

35

| No.                                                                                                              | £. s. d. |
|------------------------------------------------------------------------------------------------------------------|----------|
| 9 Frame of Copper with spiral termination on stand and needle - - - -                                            | 0 10 0   |
| 10 Compound Frame of Bismuth and Antimony, - - - - 7s. 6d. to                                                    | 0 17 6   |
| 11 Melloni's Thermo-Multiplier - - - -                                                                           | 1 0 0    |
| 12 Thermo-Multipliers of various constructions, 2s. 6d.                                                          | 1 10 0   |
| 13 Mobile wire Frame of silver and platina, on stand                                                             | 0 6 0    |
| 14 Three combined rectangular Frames of silver and platina to rotate on or between the poles of a magnet - - - - | 0 10 6   |
| 15 Professor Dowe's Thermo-Electric Machine, consisting of 100 pair of iron and platina elements                 |          |

MAGNETIC ELECTRICAL INSTRUMENTS.

|                                                                                                                                                                                                                                                    |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 1 E. M. Clarke's Cast Steel Magnets with Centres, in mahogany case - - per inch                                                                                                                                                                    | 0 1 0  |
| 2 Ditto ditto, Cylinder Bar Magnets, with polished Centres at the Poles, in mahogany box, per inch                                                                                                                                                 | 0 0 10 |
| 3 Ditto ditto, Bar Magnets arched at the Neutral Point, for suspension on a point, or from a string - - - - per inch                                                                                                                               | 0 1 1  |
| 4 Ditto ditto, Semicircular Bar Magnets, per inch                                                                                                                                                                                                  | 0 1 3  |
| 5 Common Horseshoe or Bent Bar Magnets 6d. to                                                                                                                                                                                                      | 1 10 0 |
| 6 Ditto ditto, combined - - 15s. to                                                                                                                                                                                                                | 5 10 0 |
| 7 E. M. Clarke's Cast Steel bent Bar Magnetic Batteries with Parallel Poles, combined in any number, for exhibiting magnetic electrical phenomena, retaining their electricity under all circumstances, excepting being made red hot, 3l. 10s. to  | 75 0 0 |
| 8 Ditto ditto, Magazine Magnets. These magnets are made of an odd number, so as to allow the centre magnet to be in advance of those at each side, they are constructed to take a higher charge than the above, but have not their power of reten- |        |

| NO. |                                                                                                                                                                                                                               | £. s. d. |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|     | tion, and are only used by Magneticians in the process of magnetizing - - - 15 <i>l.</i> to                                                                                                                                   | 150 0 0  |
| 9   | Horizontal and Vertical Mahogany Stands for Magnetic Batteries - - - 5 <i>s.</i> to                                                                                                                                           | 1 1 0    |
| 10  | Brass Feet with sockets for cylinder Bar Magnets, - - - 10 <i>s.</i> to                                                                                                                                                       | 1 10 0   |
| 11  | Faraday's four iron cubes on a stand, to show magnetic induction - - -                                                                                                                                                        | 0 16 0   |
| 12  | Dipping needles - - - 5 <i>s.</i> to                                                                                                                                                                                          | 4 14 6   |
| 13  | Horizontal needles, on stands, with brass or agate centres - - - 3 <i>s.</i> to                                                                                                                                               | 0 6 0    |
| 14  | Ditto on tripod stands, with adjusting screws, and vertical adjustment - - - 10 <i>s.</i> to                                                                                                                                  | 1 15 0   |
| 15  | Magnetic needles of all sizes and forms -                                                                                                                                                                                     |          |
| 16  | Mining and surveying pocket compasses in brass or mahogany boxes, with lift to the needle, 3 <i>s.</i> to                                                                                                                     | 0 10 0   |
| 17  | Gilt pocket compasses, in morocco case 6 <i>s.</i> to                                                                                                                                                                         | 3 0 0    |
| 18  | Ditto, ditto, ditto, with agate centre and lift to the needle - - -                                                                                                                                                           |          |
| 19  | Loadstone, or natural magnets, in slabs, or mounted with iron poles and armature 4 <i>s.</i> to                                                                                                                               | 7 10 0   |
| 20  | Sieves and boxes for iron filings 1 <i>s.</i> to                                                                                                                                                                              | 0 7 6    |
| 21  | Iron cubes, rings, balls, and spinners 3 <i>d.</i> to                                                                                                                                                                         | 0 1 6    |
| 22  | Magnetic ships, swans, fishes 1 <i>s.</i> to                                                                                                                                                                                  | 0 4 6    |
| 23  | Vertical cylindrical bent bar magnet on stand, with two reels of insulated copper wire, and E. M. C's binding-screw connexions to show the deflections produced on a magnetic needle by moving the helices on the poles - - - | 1 12 6   |
| 24  | Apparatus for exhibiting the effect of magnetic currents on different metals by vibrating metallic discs between the poles of a horse-shoe magnetic battery - - -                                                             | 2 0 0    |
| 25  | E. M. Clarke's combined apparatus to show the capacity of different metals for the developement of magnetism by induction. A horizontal metal-                                                                                |          |

NO.

£. s. d.

lic disc is made to rotate rapidly under a screen of glass, a magnetic needle being placed on a short point on the screen, the needle rotating with the disc. Also, when the compound magnets are made to rotate under the glass screen, and a disc of metal suspended over the screen, it rotates in the same direction with the magnets; also shows Harris's experiments of the influence of screens of different metals, in arresting the passage of magnetic induction: also, Dr. Faraday's experiment of rotating a disc of copper between the poles of a horse-shoe magnetic battery on connecting conducting wires from a galvanometer; one with the centre, the other with the periphery of the rotating disc, a permanent deflection of the needle is produced. This apparatus is also quite applicable to very many useful purposes where a horizontal or vertical rotation is required: for instance, it will show that a body in rotating rapidly about its axis always selects the shorter - - - - -

8 18 6

- 26 E. M. Clarke's Magnetic Electrical Machine, fig. 1, p. 38, including two armatures D fig. 1, p. 38, and D fig. 4, p. 40; decomposition of water apparatus, fig. 2, p. 40; voltaic magnet fig. 7, p. 38; apparatus to show the ignition of platinum wire, fig. 6, p. 40; pair of conductors R, S, fig. 1, p. 38; iron wires to show combustion, fig. 5, p. 38; lever, extra hooks, and springs Q and O, fig. 1, p. 38. The magnetic battery A fig. 1, weighs 14 lbs. The mahogany cover contains a cupboard which holds all the above apparatus, and when placed on the bottom board Y, locks to the back board B. The cupboard being then directly over the armature of the machine,

NO.

£. s. d.

prevents the multiplying wheel E being turned.

Fig. 12, p. 39, the machine with its cover on - 12 12 0

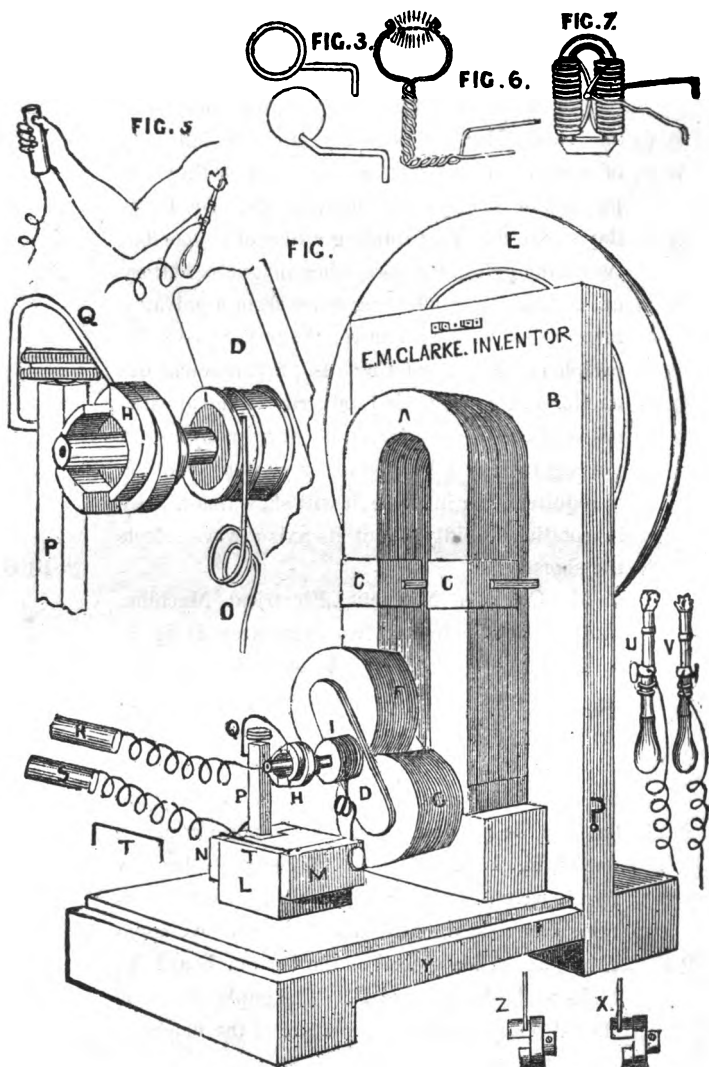


FIG. 12

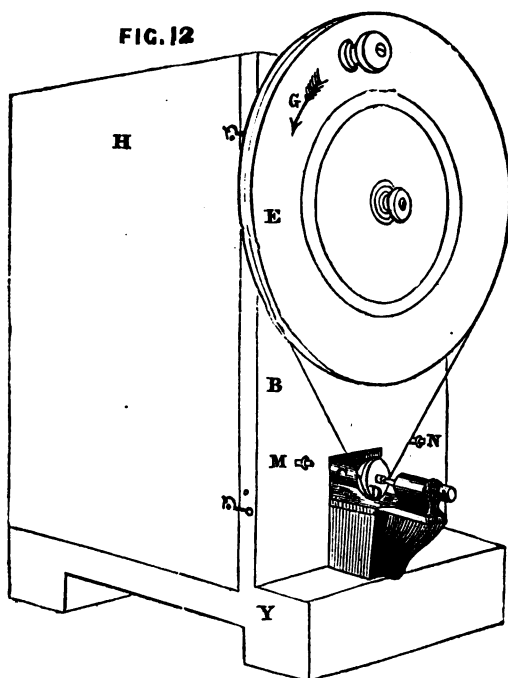
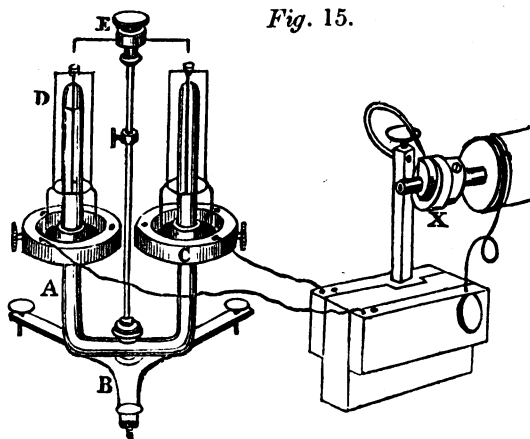


Fig. 15.



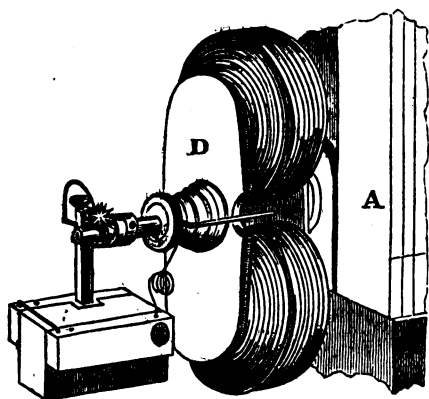


Fig. 4.

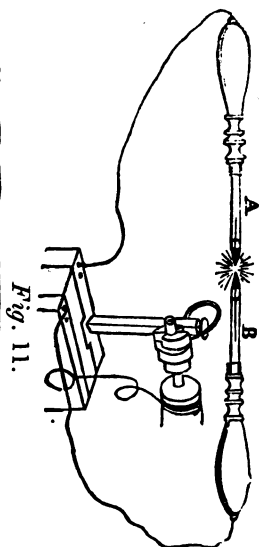


Fig. 11.

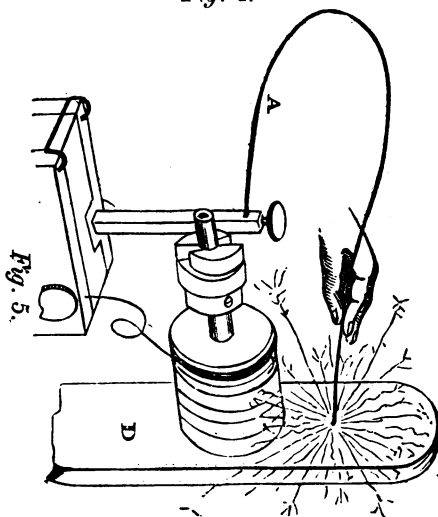


Fig. 5.

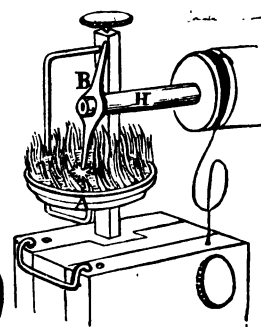


Fig. 14.

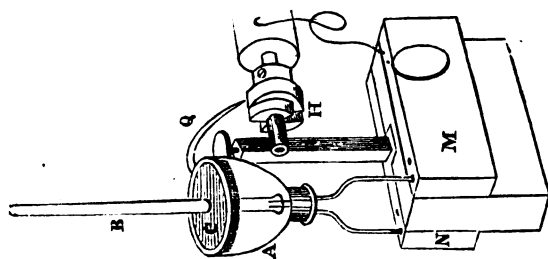
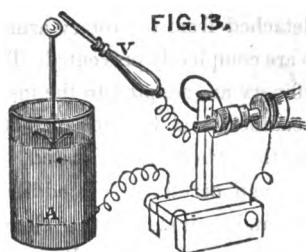


Fig. 2.



| No. |                                                                                                                                                                                                                                               | £. | s. | d.   |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|------|
| 27  | Ditto, including the intensity armature D fig. 1, p. 38; pair of conductors R, S; sponge directors U, V; lever, extra hooks, and springs, same sized magnetic battery for medical electricity, fig. 5. p. 38, a conductor and director in use | -  | 10 | 10 0 |
| 28  | Separate sponge directors, U and V, fig. 1; these serve as charcoal holders, fig. 11, p. 40.                                                                                                                                                  | -  | 0  | 7 6  |
| 29  | Decomposition of water apparatus, for collecting the gases, separate, for ditto                                                                                                                                                               | -  | 0  | 10 6 |
| 30  | Pair of platina discs, (fig 3, p. 38,) for showing the decomposition of neutral salts, for ditto                                                                                                                                              | -  | 0  | 5 6  |
| 31  | Leyden phials to charge by magnetic electricity, so as to deflect the gold leaves of the electroscope fig. 13.                                                                                                                                | -  | 0  | 10 0 |



|    |                                                                                                                                                     |   |   |     |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-----|
| 32 | Micrometer eye piece for showing the magnetic-electrical spectrum, single, 5s. 6d., double                                                          | - | 0 | 8 6 |
| 33 | Mercury cup and points to show the disadvantage of the mercury flood, fig. 14, p. 40. It also shows the combustion of mercury and ignition of ether | - | 0 | 3 0 |
| 34 | Apparatus to show brilliant flashes of magnetic electricity on burnished gold or silver paper                                                       | - | 0 | 7 6 |
| 35 | E. M. Clarke's arrangement of the vertical cylindrical magnet, with flood cups, levelling screws, on tripod stand, pair of mobile wire frames, to   |   |   |     |

| No. |                                                                                                                          | £. | s. | d. |
|-----|--------------------------------------------------------------------------------------------------------------------------|----|----|----|
|     | show rotation on the poles of ditto, by magnetic electricity, <i>fig.</i> 15. - - - -                                    | 1  | 15 | 0  |
| 36  | Mahogany stand with multiplying wheel, crank, hook, and treadle, to work the magnetic electrical machine by foot - - - - | 5  | 0  | 0  |

For a description of this Machine, see London and Edinburgh Phil. Mag. for October, 1836; Sturgeon's Quarterly Annals of Electricity, for January, 1837; Poggendorff's Annalen der Physik, No. 10, 1836; Silliman's American Journal of Science, No. 2, January, 1838; Pouillet's *Traité de Physique*, 1837; Higgins' *Experimental Philosopher*, 1838; Noad's *Lectures on Electricity*, 1839; *Monthly Times*, No. 2, 1839; *El Instructor*, for July, 1839.

This Machine is the only one that exhibits separately the effects of *quantity* and *intensity* with the full power of the magnets, which are quite detached from the rotary armatures, so that all injurious vibrations are completely prevented. The latest improvements of lathe machinery are adapted to the instrument to secure the most perfect steadiness and freedom of motion. It requires no mercury flood, so that when once adjusted, it goes through its operations with ease and certainty. In addition to its power of producing light, heat, and motion, effecting chemical compositions and decompositions, and acting powerfully on the living nerves and muscles, it deflects the gold leaves of the electroscope, charges the Leyden jar, and ignites gunpowder.

"To medical gentlemen the instrument may be strongly recommended from the following advantages—its portability, its being always in a fit state of action, even in the dampest weather, the nicety by which the power of the shocks may be increased or diminished. Indeed it combines the advantages of the electrical machine and galvanic apparatus, at the same time that it does not labour under the disadvantages of either; for, as has already been stated, it is not affected like the former by a moist condition of the atmosphere; nor, like the latter, is it necessary to make use of any acids; nay, since the improvement has been effected,

which is alluded to in the text, even the use of mercury is superseded."

E. M. Clarke feels great pleasure in being able to state that, since the invention of this instrument in 1835, it has continued to hold the highest rank amongst electrical apparatus. It has served as a basis for the exhibition of each new experiment, and the illustration of every new fact in Magnetic Electricity, since its discovery. It is really the only MAGNETIC ELECTRICAL MACHINE now quoted by the London Philosophical Instrument Makers in their catalogues of apparatus; and, he regrets to add, quoted anonymously, to avoid the acknowledgment of the inventor, E. M. Clarke.

## CHEMICAL AND PNEUMATIC INSTRUMENTS.

| NO. |                                                         | £. s. d. |
|-----|---------------------------------------------------------|----------|
| 1   | Dr. Black's Moveable Universal Furnace - 6 <i>l.</i> to | 7 0 0    |
| 2   | Improved Portable Round Furnace - 3 <i>l.</i> to        | 5 5 0    |
| 3   | Enamelling Furnace - - 4 <i>l.</i> 4 <i>s.</i> to       | 10 10 0  |
| 4   | Plumbago Portable Blast Furnace - 18 <i>s.</i> to       | 3 3 0    |
| 5   | Earthenware Table Furnaces - - -                        | 0 7 6    |
| 6   | Ingot and Cupel Moulds - - -                            | 0 1 6    |

## RETAIL LIST OF PRICES OF CRUCIBLES:

## BLACK LEAD POTS.

| NO.         | £. s. d. | NO.     | £. s. d. |
|-------------|----------|---------|----------|
| 1..... each | 0 0 2½   | 14..... | 0 2 9    |
| 2.....      | 0 0 4½   | 15..... | 0 3 3    |
| 3.....      | 0 0 6    | 16..... | 0 3 6    |
| 4.....      | 0 0 8    | 18..... | 0 4 0    |
| 5.....      | 0 0 10   | 20..... | 0 4 6    |
| 6.....      | 0 1 1    | 25..... | 0 5 6    |
| 7.....      | 0 1 3    | 30..... | 0 7 3    |
| 8.....      | 0 1 6    | 35..... | 0 8 8    |
| 9.....      | 0 1 8    | 40..... | 0 10 6   |
| 10.....     | 0 2 0    | 45..... | 0 12 6   |
| 12.....     | 0 2 3    | 50..... | 0 14 6   |

| NO.      | £. | s. | d. |
|----------|----|----|----|
| 60.....  | 0  | 17 | 0  |
| 70.....  | 0  | 18 | 6  |
| 80.....  | 1  | 2  | 6  |
| 90.....  | 1  | 5  | 0  |
| 100..... | 1  | 10 | 0  |

## SQUAKE CRUCIBLES NESTED.

|        |   |   |   |
|--------|---|---|---|
| 3..... | 0 | 3 | 0 |
| 4..... | 0 | 4 | 0 |
| 5..... | 0 | 6 | 0 |

## TRIANGULAR CRUCIBLES.

|                                |   |   |    |
|--------------------------------|---|---|----|
| $\frac{1}{2}$ in..... per doz. | 0 | 0 | 6  |
| 1.....                         | 0 | 0 | 8  |
| $1\frac{1}{2}$ .....           | 0 | 0 | 10 |
| 2.....                         | 0 | 1 | 0  |
| 3.....                         | 0 | 1 | 6  |
| $3\frac{1}{2}$ .....           | 0 | 1 | 10 |
| 4.....                         | 0 | 2 | 0  |
| $4\frac{1}{2}$ .....           | 0 | 2 | 6  |
| 5.....                         | 0 | 3 | 6  |

## ROUND CRUCIBLES.

|                      |   |   |                |
|----------------------|---|---|----------------|
| 3.....each           | 0 | 0 | $1\frac{1}{2}$ |
| 4.....               | 0 | 0 | $2\frac{1}{2}$ |
| $4\frac{1}{2}$ ..... | 0 | 0 | $3\frac{1}{2}$ |
| 5.....               | 0 | 0 | 4              |
| $5\frac{1}{2}$ ..... | 0 | 0 | 5              |
| 6.....               | 0 | 0 | $6\frac{1}{2}$ |
| $6\frac{1}{2}$ ..... | 0 | 0 | 8              |
| 7.....               | 0 | 0 | 10             |
| 8.....               | 0 | 1 | 0              |
| 9.....               | 0 | 1 | 4              |
| 10.....              | 0 | 2 | 0              |

## CHEMICAL RETORTS.

| NO.                         | £. | s. | d. |
|-----------------------------|----|----|----|
| $\frac{1}{4}$ pint.....each | 0  | 0  | 9  |
| $\frac{1}{2}$ .....         | 0  | 1  | 6  |
| 1.....                      | 0  | 2  | 0  |
| $1\frac{1}{2}$ .....        | 0  | 3  | 0  |
| 2.....                      | 0  | 3  | 6  |
| 3.....                      | 0  | 4  | 6  |
| 2 qts.....                  | 0  | 5  | 6  |
| 3.....                      | 0  | 7  | 6  |
| 4.....                      | 0  | 10 | 0  |

Tubulated 6d. each extra.

## SKITTLE POTS.

|            |   |   |   |
|------------|---|---|---|
| 3.....each | 0 | 0 | 2 |
| 4.....     | 0 | 0 | 3 |
| 5.....     | 0 | 0 | 4 |
| 6.....     | 0 | 0 | 5 |
| 7.....     | 0 | 0 | 6 |
| 8.....     | 0 | 0 | 7 |
| 9.....     | 0 | 0 | 9 |
| 10.....    | 0 | 1 | 2 |
| 11.....    | 0 | 1 | 6 |
| 12.....    | 0 | 1 | 9 |
| 14.....    | 0 | 2 | 0 |
| 16.....    | 0 | 3 | 0 |

## CASTING POTS.

|                |   |   |    |
|----------------|---|---|----|
| 5 lbs.....each | 0 | 0 | 8  |
| 10.....        | 0 | 0 | 10 |
| 15.....        | 0 | 1 | 0  |
| 20.....        | 0 | 1 | 2  |
| 30.....        | 0 | 1 | 6  |
| 40.....        | 0 | 1 | 9  |
| 50.....        | 0 | 2 | 2  |

| NO.      | £. | s. | d. | NO.       | £. | s. | d. |
|----------|----|----|----|-----------|----|----|----|
| 60. .... | 0  | 2  | 6  | 90. ....  | 0  | 3  | 6  |
| 70. .... | 0  | 2  | 10 | 100. .... | 0  | 4  | 0  |
| 80. .... | 0  | 3  | 0  | 120. .... | 0  | 5  | 0  |

## Fine Stourbridge Loam.—Fire Lumps, Bricks, and Tiles.

|                                                                                                    |    |            |        |
|----------------------------------------------------------------------------------------------------|----|------------|--------|
| 1 Iron Tongs, Shovels and Ladles, for Furnaces                                                     | -  | -          | -      |
| 2 Platinum, Silver, and Iron Crucibles                                                             | -  | -          | -      |
| 3 Skittle and Calcining Pot Crucibles                                                              | -  | -          | -      |
| 4 Muffles for Assaying                                                                             | -  | 1s. to     | 0 2 6  |
| 5 Trays for Assaying                                                                               | -  | 4d. to     | 0 1 0  |
| 6 Bone-ash Tests and Cupels                                                                        | -  | 1s. 6d. to | 0 2 6  |
| 7 Glass Retorts, plain and tubulated, of all sizes, 9d. to                                         | -  | -          | 0 10 0 |
| 8 Tinned Iron Japanned Gasometer, Bell, 7½ inches wide, 13 inches high                             | -  | -          | 2 16 0 |
| 9 Ditto Sheet Copper ditto, same size                                                              | -  | -          | 4 14 6 |
| 10 Tinned Ironed Japanned Gasometer, Bell 10 inches wide, 22 inches high                           | -  | -          | 4 4 0  |
| 11 Strong Sheet Copper ditto, same size                                                            | -  | -          | 8 8 0  |
| 12 Pepy's Improved Gas Holder, Tinned Iron Japanned, 9 inches wide, 13 inches high                 | -  | -          | 2 9 0  |
| 13 Ditto Strong Sheet Copper, same size                                                            | -  | -          | 4 10 0 |
| 14 Pepy's Improved Gas Holder, Tinned Iron Japanned, 12 by 18 inches                               | -  | -          | 2 17 0 |
| 15 Ditto Strong Sheet Copper, 13 by 20 inches                                                      | -  | -          | 4 14 6 |
| 16 Pepy's Mercurial Gasometer                                                                      | -  | -          | 6 6 0  |
| 17 Pneumatic Troughs of Copper, or Tinned Iron Japanned, of every description and size, 3s. 6d. to | 3  | 3          | 0      |
| 18 Barker's Improved Pneumatic Trough, Tin or Copper, - - - - - 1l. 1s. to                         | 3  | 3          | 0      |
| 19 Cast Iron Mercurial Pneumatic Trough, with Pepy's Gasometer - - - - -                           | 10 | 10         | 0      |
| 20 E. M. Clarke's Improved Cast Iron Mercurial Trough, with filling blocks and trays - - - - -     | 1  | 15         | 0      |

| NO. |                                                                                                                                       | £. s. d. |
|-----|---------------------------------------------------------------------------------------------------------------------------------------|----------|
| 21  | Mercurial Troughs of Cast Iron or Mahogany, on most approved principles - 7s. 6d. to                                                  | 1 10 0   |
| 22  | Wrought Iron Retorts, with gun barrel Tube ground in the neck, and flexible conducting tube - - - - -                                 | 0 18 0   |
| 23  | Cast Iron ditto ditto - - - - -                                                                                                       | 0 12 0   |
| 24  | Wedgwood-ware Retorts - - 10d. to                                                                                                     | 0 10 0   |
| 25  | Leaden Retorts for Fluoric Acid - 8s. to                                                                                              | 0 10 0   |
| 26  | Leaden Bottles for Fluoric Acid - 4s. to                                                                                              | 0 10 6   |
| 27  | Knox's Fluor Spar Apparatus for Experiments when Fluoric Acid is required, described in the Transactions of the Royal Irish Academy - |          |
| 28  | Best large Brass Retort Stand with five Discharging Rings, and Knox's Triangle Runners -                                              | 2 2 0    |
| 29  | Second size ditto ditto, with three Discharging Rings - - - - -                                                                       | 1 15 0   |
| 30  | Retort Stands with five Sliding Brass Rings, with Knox's Triangle Runners - - -                                                       | 1 10 0   |
| 31  | Ditto ditto 3 Rings and Knox's Triangle Runners                                                                                       | 1 1 0    |
| 32  | Retort Stands, with three sliding brass rings, brass rod, a japanned iron foot - 7s. 6d. to                                           | 1 1 0    |
| 33  | Knox's Test Tube and Retort Holder, with socket and ball motion for ditto - - -                                                       | 1 1 0    |
| 34  | Chemical Thermometer, with boxwood scale to fold back at bottom, scale from freezing to boiling point of Mercury - - - 14s. to        | 0 18 0   |
| 35  | Ditto graduated on the glass tube - - -                                                                                               | 1 1 0    |
| 36  | Ditto, with spirits of Wine for low temperatures                                                                                      | 0 15 0   |
| 37  | Air Thermometers - - - 7s. 6d. to                                                                                                     | 0 16 0   |
| 38  | Leslie's Differential Thermometer 9s. to                                                                                              | 1 11 6   |
| 39  | Thermometers - - - 4s. 6d. to                                                                                                         | 1 11 6   |
| 40  | Standard Thermometers - 1l. 10s. to                                                                                                   | 2 12 6   |
| 41  | Six's Registering Thermometer 1l. 5s. to                                                                                              | 1 15 6   |
| 42  | Horizontal Registering Thermometer - - -                                                                                              | 1 4 0    |
| 43  | Day or Night ditto, singly - - -                                                                                                      | 0 10 0   |

| No. |                                                                                                                                                                                                   | £. | s. | d. |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
| 44  | Lithographed graduated paper scales on mahogany veneer for air, differential, and other comparative Thermometers, used on lecture tables, from 2s. to                                             | 0  | 10 | 0  |
| 45  | Leslie's Photometer - - - - -                                                                                                                                                                     | 2  | 5  | 0  |
| 46  | Leslie's Hygrometer - - - - -                                                                                                                                                                     | 2  | 2  | 0  |
| 47  | Daniel's ditto - - - - -                                                                                                                                                                          | 2  | 10 | 0  |
| 48  | Mason's ditto - - - - -                                                                                                                                                                           | 2  | 12 | 0  |
| 49  | A large Table Air Pump, including large Glass receiver and guage - - - - -                                                                                                                        | 12 | 12 | 0  |
| 50  | Ditto, on a stand, with barometer guage -                                                                                                                                                         | 18 | 18 | 0  |
| 51  | Second Size smaller, including glass receiver and guage - - - - -                                                                                                                                 | 10 | 10 | 0  |
| 52  | Third size, Air Pump - - - - -                                                                                                                                                                    | 7  | 7  | 0  |
| 53  | Ditto, single barrelled - 1l. 11s. 6d. to                                                                                                                                                         | 4  | 4  | 0  |
| 54  | Condensing Machine - - - - -                                                                                                                                                                      | 7  | 7  | 0  |
| 55  | Exhausting and condensing Syringes 10s. 6d. to                                                                                                                                                    | 1  | 7  | 0  |
| 56  | Guinea and Feather Apparatus, demonstrating the resistance of Air, with 1, 2, or 3 falls 18s. to                                                                                                  | 1  | 11 | 6  |
| 57  | A set of Windmills for the same purposes, 1l. 11s. 6d. to                                                                                                                                         | 2  | 12 | 6  |
| 58  | Marcet's Apparatus for Freezing Water -                                                                                                                                                           | 0  | 15 | 0  |
| 59  | A Bell for proving that there is no sound without air, 10s. 6d. Ditto Barker's with clock -                                                                                                       | 4  | 4  | 0  |
| 60  | A Model of a Lifting Pump - - - - -                                                                                                                                                               | 1  | 11 | 6  |
| 61  | Model of the Forcing Pump - - - - -                                                                                                                                                               | 3  | 0  | 0  |
| 62  | Models of the two foregoing Pumps, mounted on a mahogany frame, with water trough, &c. -                                                                                                          | 5  | 15 | 6  |
| 63  | Bladder Glass or Hand Glass, to show the pressure of the air - - - - -                                                                                                                            | 0  | 3  | 6  |
| 64  | Torricelli's experiment to illustrate that the mercury in barometer tubes is supported by the pressure of the air on its surface in the cistern, in which the open ends of the tubes are placed - | 0  | 18 | 0  |
| 65  | Glass Flask, mounted with cap and stop-cock, for illustrating the influence of diminished pressure in facilitating ebullition - - - - -                                                           | 0  | 7  | 6  |

| NO.                                                                                                                                                                                                 | £. s. d.              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 66 Double Transfer Plates, with connecting pipes and three stop-cocks - - - - -                                                                                                                     | 3 0 0                 |
| 67 Single Transfer Plate, stopcock, jet, and lengthening tube for fountain in Vacuo, Glass Receiver, 30 inches long - - - - -                                                                       | 1 18 0                |
| 68 A Flat Plate, with collar of leathers, and sliding wire, for placing on receivers - - - - -                                                                                                      | 0 15 0                |
| 69 Brass Hemispheres, to show the external pressure of air - - - - -                                                                                                                                | 1 <i>l.</i> to 1 18 0 |
| 70 Lead Weights and Bladder, to show the elasticity of air - - - - -                                                                                                                                | 0 15 0                |
| 71 A Glass Vessel for making a Fountain in vacuo - - - - -                                                                                                                                          | 0 16 0                |
| 72 A Filtering Cup to show the porosity of wood - - - - -                                                                                                                                           | 0 6 6                 |
| 73 Receivers for Air Pumps, per lb. - - - - -                                                                                                                                                       | - - -                 |
| 74 Air Fountains in Copper, with various jets, 3 <i>l.</i> 13 <i>s.</i> 6 <i>d.</i> to 10 10 0                                                                                                      |                       |
| 75 A small Air Pump, with Apparatus for exhibiting to the Beginner in the Science its general properties, and calculated to perform a considerable number of Experiments. Packed in a box - - - - - | 5 5 0                 |
| 76 Professor Daniell's Oxy-hydrogen Blowpipe, with Maugham's Jets and Cary's Lime holder - - - - -                                                                                                  | 1 5 0                 |
| 77 Ditto ditto, including two Stop Cocks and Union Coupler for the Hydrogen, <i>fig.</i> 15. - - - - -                                                                                              | 1 12 6                |

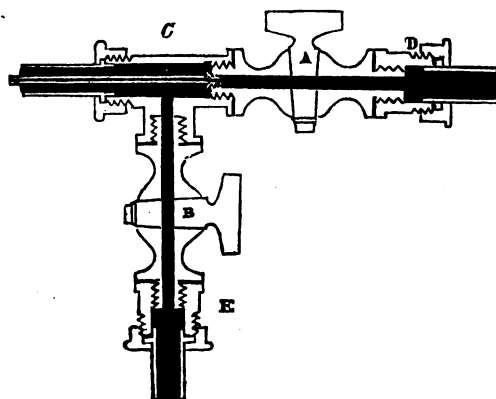
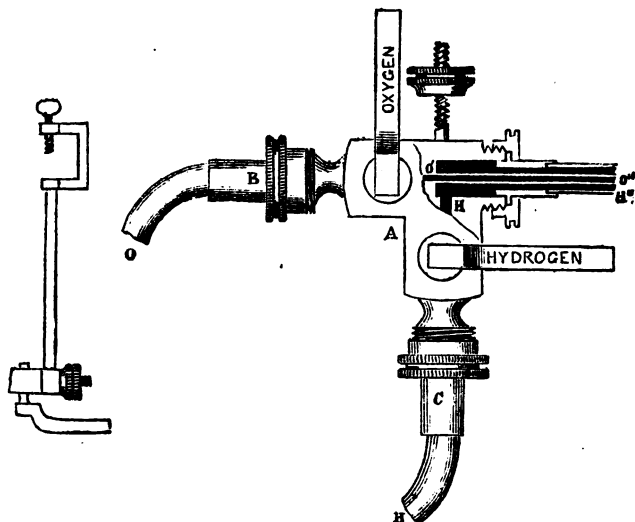


Fig. 15.



| No. |                                                                                                                                                                                                                   | £. | s. | d.    |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|-------|
| 78  | Ditto, as improved by E. M. C. whereby he has removed the inconvenience occasioned by the use of so many separate parts, including Stop Cocks and so many Union Joints, in mahogany lock-up-case, <i>fig. 16.</i> | -  | -  | 3 3 0 |

*Fig. 16.*

|    |                                                                               |     |     |     |     |         |    |    |   |
|----|-------------------------------------------------------------------------------|-----|-----|-----|-----|---------|----|----|---|
| 79 | Mouth Blowpipes in Glass, Brass, Plain, Portable, &c.                         | -   | -   | -   | -   | 1s. to  | 0  | 10 | 0 |
| 80 | Gurney's, Hemming's, Otley's, and Compression Blow-pipe for the Mixed Gasses, | -   | -   | -   | -   | 10s. to | 2  | 10 | 0 |
| 81 | Cuthbert's Improved Hydraulic Blowpipe                                        | 2l. | 2s. | to  | 2   | 12      | 6  |    |   |
| 82 | Blowpipe Lamps for Oil or Tallow                                              | 2s. | 6d. | to  | 0   | 12      | 6  |    |   |
| 83 | Bladder, with Stop Cock and Jet                                               | -   | -   | -   | 0   | 7       | 6  |    |   |
| 84 | Strong Steel Forceps, with hardened points                                    | -   | -   | -   | 0   | 6       | 0  |    |   |
| 85 | Plain Glass Balloon Receivers                                                 | -   | 1s. | 6d. | to  | 0       | 10 | 0  |   |
| 86 | Tubulated ditto,                                                              | -   | -   | 2s. | 6d. | to      | 0  | 14 | 0 |
| 87 | Quilled Glass Balloon Receivers                                               | -   | -   | 2s. | 6d. | to      | 0  | 12 | 0 |
| 88 | Quilled and Tubulated ditto                                                   | -   | -   | 3s. | to  | 0       | 16 | 0  |   |
| 89 | Glass Matrasses                                                               | -   | -   | 1s. | 6d. | to      | 0  | 6  | 0 |
| 90 | Glass Alembics                                                                | -   | -   | 4s. | 6d. | to      | 1  | 10 | 6 |

| NO. |                                                                                                                                                      | £. | s. | d. |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
| 91  | Silver Alembics, with Glass Capital, 1 <i>l.</i> 1 <i>s.</i> 6 <i>d.</i> to                                                                          | 4  | 4  | 0  |
| 92  | Gas Flasks, with Bent Glass Tubes, ground in,<br>3 <i>s.</i> 6 <i>d.</i> to                                                                          | 0  | 6  | 6  |
| 93  | Digesting Flasks - - - 1 <i>s.</i> 6 <i>d.</i> to                                                                                                    | 0  | 5  | 0  |
| 94  | Florence Flasks - - - - -                                                                                                                            | 0  | 0  | 6  |
| 95  | Glass Flasks, mounted with brass cap, stop cock,<br>and connecting piece - - - -                                                                     | 0  | 8  | 0  |
| 96  | Lamp Furnace with copper chimney - - -                                                                                                               | 0  | 10 | 0  |
| 97  | Ditto, with double wick, and fountain reservoir of<br>oil - - - - -                                                                                  | 1  | 16 | 0  |
| 98  | Glass and Brass Spirit Lamps with ground caps,<br>3 <i>s.</i> 6 <i>d.</i> to                                                                         | 0  | 5  | 6  |
| 99  | Rumford's Spirit Lamp, three Wicks, Copper -                                                                                                         | 0  | 9  | 0  |
| 100 | Rumford's Spirit Lamp, improved by E. M.<br>Clarke. The spirit in this lamp is prevented<br>going to waste when not in use - - -                     | 1  | 1  | 0  |
| 101 | Chemical Stopcocks that will stand the test of a<br>high condensation, with brass bodies and gun<br>metal plugs, and vice versâ - - - 4 <i>s.</i> to | 0  | 10 | 6  |
| 102 | Plain T and Elbow connecting Pieces, 1 <i>s.</i> 6 <i>d.</i> to                                                                                      | 0  | 5  | 0  |
| 103 | Brass Tobacco Pipe that screws in Stop Cocks -                                                                                                       | 0  | 3  | 0  |
| 104 | Revolving Jet that screws in Stop Cocks -                                                                                                            | 0  | 7  | 6  |
| 105 | Brass Caps with Stopcock Screw, to cement on<br>retorts, receivers, &c. - - - 1 <i>s.</i> to                                                         | 0  | 3  | 6  |
| 106 | Plain, capped, and stoppered Air Jars of different<br>sizes - - - - - 1 <i>s.</i> 6 <i>d.</i> to                                                     | 0  | 14 | 0  |
| 107 | Plain Air Jars, in nests of 3, 4, and 5, with<br>ground edges - - - - - 5 <i>s.</i> to                                                               | 0  | 8  | 6  |
| 108 | Air Jars, divided into cubical inches and decimal<br>parts - - - - - 4 <i>s.</i> to                                                                  | 0  | 14 | 0  |
| 109 | Deflagrating Ladles, per doz. - - - 6 <i>s.</i> to                                                                                                   | 0  | 12 | 0  |
| 110 | Ground Brass Plates, with collar of leathers to<br>cover air jars - - - - - 2 <i>s.</i> 6 <i>d.</i> to                                               | 0  | 5  | 6  |
| 111 | Cubic-inch Bottles, plain and graduated, 3 <i>s.</i> to                                                                                              | 0  | 6  | 0  |
| 112 | Graduated Glass Measures - - - 2 <i>s.</i> to                                                                                                        | 0  | 12 | 0  |
| 113 | Ditto Drop Measures - - - 2 <i>s.</i> 6 <i>d.</i> to                                                                                                 | 0  | 7  | 0  |

| NO. |                                                                                                                          |                  | £. | s. | d. |
|-----|--------------------------------------------------------------------------------------------------------------------------|------------------|----|----|----|
| 114 | Precipitating Glasses                                                                                                    | - - 1s. 6d. to   | 0  | 5  | 6  |
| 115 | Ditto Rods, Bars, and Plates of different Metals,                                                                        | 6d. to           | 0  | 11 | 0  |
| 116 | Glass, Earthenware, and Iron Tubes                                                                                       | -                |    |    |    |
| 117 | Hydrostatic, Separating, and Wedgwood Funnels,                                                                           | 3d. to           | 0  | 8  | 0  |
| 118 | Glass Funnels                                                                                                            | - - 5d. to       | 0  | 4  | 0  |
| 119 | Glass Syphons                                                                                                            | - - 1s. to       | 0  | 3  | 6  |
| 120 | Woulf's Apparatus, consisting of three 3-necked<br>Bottles, with conducting and safety tubes in<br>tray                  | - - - 1l. 4s. to | 2  | 2  | 0  |
| 121 | Ditto in Pint Bottles                                                                                                    | - - -            | 1  | 10 | 0  |
| 122 | Ditto Quart ditto                                                                                                        | - - -            | 1  | 18 | 0  |
| 123 | Two and three-necked Bottles, separate,                                                                                  | 3s. 6d. to       | 0  | 8  | 0  |
| 124 | Ground Stoppered Glass Bottles, with and with-<br>out glass caps                                                         | - - 2s. to       | 0  | 10 | 6  |
| 125 | Dropping Bottles and Tubes                                                                                               | - 1s. 6d. to     | 0  | 2  | 6  |
| 126 | Evaporating Basins in Glass, Wedgwood-ware,<br>Silver, Platinum, Copper, with and without<br>lips, in sets or single     | - - 1s. to       | 10 | 0  | 0  |
| 127 | Glass Test Tubes, per dozen set, 3 each,                                                                                 | 3s. to           | 0  | 6  | 0  |
| 128 | Ditto Racks and Holders                                                                                                  | - - 1s. to       | 0  | 16 | 0  |
| 129 | Fergusson's Pyrometer                                                                                                    | - - 3l. 3s. to   | 5  | 5  | 0  |
| 130 | Wollaston's Cryophorus                                                                                                   | - - 3s. 6d. to   | 1  | 12 | 0  |
| 131 | Freezing Apparatus                                                                                                       | - - 15s. to      | 2  | 2  | 0  |
| 132 | Double Steel Forceps, with platinum tips at one<br>end, and hardened points at the other,                                | 7s. 6d. to       | 0  | 15 | 0  |
| 133 | Deflagrating Forceps                                                                                                     | - - -            | 0  | 8  | 6  |
| 134 | Blowpipe Spoons of silver or platinum                                                                                    | - 4s. to         | 0  | 9  | 6  |
| 135 | Ditto Jets of brass or platinum                                                                                          | - 1s. to         | 0  | 5  | 0  |
| 136 | Mortars, with Pestles of Wedgwood-ware, Paris-<br>ian porcelain, glass, agate, flint, steel, and iron,                   | 1s. 6d. to       | 2  | 2  | 0  |
| 137 | Assay Balances, with framed beam and steel<br>knife edges on agate planes, in mahogany, glass<br>case, with weights, &c. | - - 8l. 8s. to   | 14 | 14 | 0  |

| No. |                                                                                                                      | £. s. d. |
|-----|----------------------------------------------------------------------------------------------------------------------|----------|
| 138 | Hydrostatic Balances, with steel beams, packed<br>in mahogany case - - 3 <i>l.</i> 3 <i>s.</i> to                    | 8 8 0    |
| 139 | Balances with pearl and metal pans, weights, &c.,<br>10 <i>s.</i> 6 <i>d.</i> to                                     | 1 11 0   |
| 140 | Boxes of Decimal Weights, in brass, silver, and<br>platinum - - - 15 <i>s.</i> to                                    | 2 10 0   |
| 141 | Hydrometers - - - -                                                                                                  | -        |
| 142 | Nicholson's Gravimeter - - - -                                                                                       | 1 10 0   |
| 143 | Improved Glass Hydrometers and Saccharometers<br>2 <i>s.</i> 6 <i>d.</i> to                                          | 1 1 0    |
| 144 | Ditto, ditto, Saccharometer for brewing -                                                                            | 0 14 0   |
| 145 | Welter's Tube of Safety - - - -                                                                                      | 0 2 6    |
| 146 | Caoutchouc Gas Bags, with brass connexions,<br>16 <i>s.</i> to                                                       | 2 2 0    |
| 147 | Sheets of prepared Caoutchouc, for making con-<br>nexions - - - -                                                    | 0 1 6    |
| 148 | Caoutchouc Tubes, per foot - - - -                                                                                   | 0 1 6    |
| 149 | Flexible Metallic Tube, per foot - 6 <i>d.</i> to                                                                    | 0 1 0    |
| 150 | Wollaston's Scale of chemical equivalents -                                                                          | 0 4 0    |
| 151 | Scale of chemical equivalents by Cuff -                                                                              | 0 5 6    |
| 152 | Warrington's Chemical tables - - - -                                                                                 | 0 3 0    |
| 153 | Reid's Chemical Abacus for facilitating the study<br>of the Atomic Theory of Dalton and Berzelian<br>Symbols - - - - | 0 1 6    |
| 154 | Priestley's Eudiometer - - - 5 <i>s.</i> to                                                                          | 0 12 0   |
| 155 | Berthollet's Eudiometer - - - -                                                                                      | 0 5 0    |
| 156 | Hope's ditto - - - -                                                                                                 | 0 8 0    |
| 157 | Davy's ditto - - - -                                                                                                 | 0 7 0    |
| 158 | Pepy's ditto - - - -                                                                                                 | 0 10 0   |
| 159 | Ure's Detonating Eudiometer - - - -                                                                                  | 0 12 0   |
| 160 | Cooper's ditto ditto - - - -                                                                                         | 0 18 0   |
| 161 | Volta's ditto ditto - - - -                                                                                          | 0 12 0   |
| 162 | Ditto, with iron spring for mercurial trough, to<br>ensure safety to the operator - - - -                            | 0 18 0   |
| 163 | Cavendish's Eudiometer for the explosion of in-<br>flammable gases by the electric spark -                           | 3 3 0    |

| NO. |                                                                                                                                                                                                                                                                                                       | £. | s. | d. |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
| 164 | Sand Baths of Copper, fitting into the rings of the retort stand - - - -                                                                                                                                                                                                                              | 0  | 3  | 6  |
| 165 | Marcet's Watch-glass holder - - - -                                                                                                                                                                                                                                                                   | 0  | 1  | 6  |
| 166 | Strong hollow Iron Spheres. This apparatus shows the expansive force exerted in the congelation of water - - - -                                                                                                                                                                                      | 0  | 4  | 6  |
| 167 | Brass Guage, with cylindrical metal rod, to illustrate the expansion of a metal when its temperature is increased - - - 4s. to                                                                                                                                                                        | 0  | 7  | 0  |
| 168 | Double Bar or Slip, composed of brass and iron, for illustrating the unequal expansion in two metals, when heated - - - 2s. 6d. to                                                                                                                                                                    | 0  | 7  | 0  |
| 169 | Apparatus to exhibit the force of contraction in a metallic bar when it is suddenly reduced from a red heat to a comparatively low temperature. This contrivance shows the fact by the contracting bar snapping another bar connected with it                                                         | 1  | 1  | 0  |
| 170 | Apparatus for exhibiting the relative degrees of expansion produced in different liquids by like elevations of temperature - - - -                                                                                                                                                                    | 2  | 16 | 0  |
| 171 | Glass Apparatus for showing the condensation in volume and heat given out with mixtures of water with sulphuric acid - - - -                                                                                                                                                                          | 0  | 7  | 6  |
| 172 | E. M. Clarke's arrangement of the Zinc Parabolic Mirrors on stands for experiments, with radiant heat. Mirrors 12 inches diameter including iron ball and 3 adjusting stands - - - -                                                                                                                  | 5  | 0  | 0  |
| 173 | Marcet's Steam Apparatus with barometer and thermometer attached. This instrument E. M. C. makes of cast iron, thereby doing away with the accidents by explosion which have occurred owing to the action of the mercury on the brass rendering it incapable of confining high pressure steam - - - - | 3  | 13 | 6  |
| 174 | Leslie's Radiator. This apparatus consists of a square tin vessel, with its sides coated with differ-                                                                                                                                                                                                 |    |    |    |

| NO. |                                                                                                                                                                                                                                                                                                         | £.         | s. | d.                     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----|------------------------|
|     | ent substances. When hot water is placed in the vessel, power of radiation of each side can be examined by turning them towards the reflector                                                                                                                                                           |            |    |                        |
|     |                                                                                                                                                                                                                                                                                                         | 10s. 6d to | 0  | 15 0                   |
| 175 | Metallic Vessels, with polished and blackened surfaces, for showing the effects of the absorption and radiation of different surfaces                                                                                                                                                                   | -          | -  | 0 4 6                  |
| 176 | Apparatus to illustrate the different radiating powers of two different surfaces. Shows that when the heated body is placed equidistant between the surfaces, a piece of phosphorus fixed behind the blackened surface is inflamed, while a similar piece behind the polished surface remains unchanged | -          | -  | 0 15 0                 |
| 177 | A Brass Working Model of Hero's Steam Engine                                                                                                                                                                                                                                                            |            |    | 5 15 6                 |
| 178 | Ditto of De Caus's ditto                                                                                                                                                                                                                                                                                | -          | -  | 3 12 6.                |
| 179 | Ditto of Branca's ditto                                                                                                                                                                                                                                                                                 | -          | -  | 5 5 0                  |
| 180 | Ditto of Savary's ditto                                                                                                                                                                                                                                                                                 | -          | -  | 7 10 0                 |
| 181 | A Brass Working Model of Newcomen's Atmospheric Engine                                                                                                                                                                                                                                                  | -          | -  | 15 0 0                 |
| 182 | Brass Working Model of Cartwright's Engine                                                                                                                                                                                                                                                              | -          |    | 21 0 0                 |
| 183 | Dr. Wollaston's Glass Steam Apparatus for explaining the nature of condensed steam                                                                                                                                                                                                                      | -          |    | 0 7 6                  |
| 184 | A Brass Working Model of Boulton and Watt's double acting Steam Engine, $3\frac{1}{2}$ inch stroke, beam 15 inches                                                                                                                                                                                      | -          | -  | 40 0 0                 |
| 185 | Brass Working Model of Woolfe's double cylinder Steam Engine                                                                                                                                                                                                                                            | -          | -  | 45 0 0                 |
| 186 | Brass Working Model of Trevethic's High Pressure Steam Engine                                                                                                                                                                                                                                           | -          | -  | 9 19 6                 |
| 187 | Ditto, ditto, Locomotive                                                                                                                                                                                                                                                                                | -          | -  | 15 15 0                |
| 188 | Locomotive Steam Engine Models for Railroads or Boats                                                                                                                                                                                                                                                   | -          | -  | 7l. 7s. to 55 0 0      |
| 189 | Brass Working Models of Vibrating Steam Engines,                                                                                                                                                                                                                                                        | -          | -  | 4l. 14s. 6d. to 7 17 6 |
| 190 | Model of Perkins's Steam Gun with boiler complete                                                                                                                                                                                                                                                       | -          | -  | 50 0 0                 |

NO.

£. s. d.

191 Chemical Cabinet Stand of 48 glass stoppered bottles containing as follows —

## FIRST SHELF.

|                     |                       |
|---------------------|-----------------------|
| 1 Tartaric acid     | 7 Alcohol             |
| 2 Acetate lead      | 8 Muriate lime        |
| 3 Pure oxalic acid  | 9 Carbonate ammonia   |
| 4 Sulphate copper   | 10 Iodide potassium   |
| 5 Phosphate soda    | 11 Tartarate antimony |
| 6 Sulphate magnesia | 12 Muriate ammonia    |

## SECOND SHELF.

|                      |                         |
|----------------------|-------------------------|
| 13 Chloride barium   | 19 Chloride gold        |
| 14 Phosphoric acid   | 20 Oxalate ammonia      |
| 15 Chloride platinum | 21 Carbonate potash     |
| 16 Sulphate iron     | 22 Solution pure potash |
| 17 Sulphuric acid    | 23 Bichromate potash    |
| 18 Iodine            | 24 Ferrocyanate potash  |

## THIRD SHELF.

|                           |                       |
|---------------------------|-----------------------|
| 25 Hydrosulphate ammonia  | 31 Chromate potash    |
| 26 Lime water             | 32 Sulphate nickel    |
| 27 Chloride cobalt        | 33 Chloride cadmium   |
| 28 Permuriate iron        | 34 Sulphate zinc      |
| 29 Bichloride mercury     | 35 Nitrate Bismuth    |
| 30 Red precipitate potash | 36 Bicarbonate potash |

## FOURTH SHELF.

|                          |                      |
|--------------------------|----------------------|
| 37 Sulphate alumina      | 43 Nitrate Mercury   |
| 38 Pure nitric acid      | 44 Sulphate potash   |
| 39 Sulphuretted hydrogen | 45 Nitrate silver    |
| 40 Fluosilicic acid      | 46 Pure Soda         |
| 41 Chloride tin          | 47 Succinate ammonia |
| 42 Muriatic acid         | 48 Tincture galls    |

four drawers containing test tubes, glass blow-pipe, dropping tube, stirring rod, watch glasses, glass tubes, turmeric and litmus paper, filtering paper, Marcet's watch glass holder and test tube holder, complete

- - - 5 10 0

## DRAWING INSTRUMENTS.

|                                          |                 |    |   |      |
|------------------------------------------|-----------------|----|---|------|
| 1 Drawing Instruments in skin cases,     | from 6s. to     | 3  | 3 | 0    |
| 2 Magazine Cases of drawing instruments, | from            |    |   |      |
|                                          | 4l. 14s. 6d. to | 30 | 0 | 0    |
| 3 Proportional compasses                 | -               | -  | 1 | 11 6 |
| 4 Ditto, with adjustment                 | -               | -  | 3 | 0 0  |
| 5 Triangular compasses                   | - from 1s. to   | 1  | 1 | 0    |
| 6 Tube compasses in case                 | -               | -  | 2 | 2 0  |

| NO. |                                                                                        | £. | s. | d. |
|-----|----------------------------------------------------------------------------------------|----|----|----|
| 7   | Turn-in compasses, with bow handles, in case, -                                        | 1  | 16 | 0  |
| 8   | Ditto, with lengthening bars -                                                         | 3  | 0  | 0  |
| 9   | Ditto, plain without additions -                                                       | 1  | 10 | 0  |
| 10  | Sector jointed hair dividers - - -                                                     | 0  | 10 | 6  |
| 11  | Long jointed ditto - - -                                                               | 0  | 7  | 6  |
| 12  | Bow pen or bow pencil, each - - -                                                      | 0  | 6  | 0  |
| 13  | Double-jointed ditto, each - - -                                                       | 0  | 12 | 6  |
| 14  | Plain Sector-jointed dividers - - -                                                    | 0  | 7  | 0  |
| 15  | Drawing Pens - - from 2s. 6d. to                                                       | 0  | 7  | 6  |
| 16  | Spring Dividers, with pen or pencil leg - -                                            | 0  | 10 | 6  |
| 17  | Wheel Pen, with four wheels for dotting -                                              | 0  | 12 | 6  |
| 18  | Pocket Dividers, with sheath - - -                                                     | 0  | 9  | 0  |
| 19  | Plain Beam Compasses, with pen and pencil points,<br>two or three feet in length - - - | 2  | 5  | 0  |
| 20  | Bent Beam Compasses with double adjustment,<br>from 3l. 13s. 6d. to                    | 5  | 15 | 6  |
| 21  | Pins for fixing paper to drawing boards, per doz.                                      | 0  | 2  | 6  |
| 22  | Ebony Parallel Rules of all lengths, 2s. 6d. to                                        | 0  | 18 | 0  |
| 23  | Ebony Rolling Parallel Rules 7s. 6d. to                                                | 2  | 12 | 6  |
| 24  | Ivory and Box Folding Rules for the Pocket<br>1s. 6d. to                               | 2  | 2  | 0  |

## MISCELLANEOUS APPARATUS.

|    |                                                                                                                         |    |    |   |
|----|-------------------------------------------------------------------------------------------------------------------------|----|----|---|
| 1  | The Mechanical Powers, consisting of Levers,<br>Pulleys, Inclined Plane, Wedges, Wheel and<br>Axle, in mahogany - - - - | 7  | 10 | 0 |
| 2  | Ditto brass - - - -                                                                                                     | 10 | 0  | 0 |
| 3  | Compound Engine, in which all these powers work<br>together - - - 3l. 0s. to                                            | 7  | 7  | 0 |
| 4  | Holtzaphell's Apparatus to show the Composition<br>of Velocities, improved by E. M. Clarke -                            | 2  | 10 | 0 |
| 5  | Sliding jointed Parallelograms - - -                                                                                    | 6  | 10 | 0 |
| 6  | Apparatus to show the Equilibrium of Forces,<br>2l. 2s. to                                                              | 10 | 10 | 0 |
| 7  | Apparatus to show the Collision of Elastic and<br>Non-Elastic Spheres - - 1l. 10s. to                                   | 7  | 7  | 0 |
| 8  | Inclined Ruler and Double Cone to show the de-<br>scent of Gravity - - - 6s. to                                         | 1  | 0  | 0 |
| 9  | Brass Grooved Wheel, so as to supersede the ex-<br>perience of Attwood's Machine - - -                                  | 2  | 15 | 0 |
| 10 | Pendulum and Levers to beat time for ditto -                                                                            | 1  | 10 | 0 |
| 11 | Apparatus to show that fluids maintain their<br>level - - - 2l. 2s. to                                                  | 5  | 0  | 0 |
| 12 | Apparatus to show that the Pressure of Fluids is<br>according to height, not quantity 1l. 10s. to                       | 5  | 5  | 0 |
| 13 | Hydrostatic Bellows - - - 2l. to                                                                                        | 4  | 0  | 0 |
| 14 | Tantalus Cup - - - -                                                                                                    | 0  | 8  | 0 |



| no. |                                                                                                                                                                   | £. | s. | d. |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
| 15  | Condensed Air Fountain and Jet - 2l. 10s. to                                                                                                                      | 7  | 7  | 6  |
| 16  | Parallel Glass Tubes to show Capillary Attraction - 2s. 6d. to                                                                                                    | 0  | 5  | 0  |
| 17  | Glass Balloon in tall Jar - - -                                                                                                                                   | 1  | 1  | 0  |
| 18  | Archimedes' Screw - - 1l. 10s. to                                                                                                                                 | 4  | 14 | 6  |
| 19  | Rope Pump - - - -                                                                                                                                                 | 6  | 16 | 6  |
| 20  | Chain Pump - - - -                                                                                                                                                | 8  | 8  | 0  |
| 21  | Pair of 36-inch Globes on mahogany stands -                                                                                                                       |    |    |    |
| 22  | Ditto 21-inch ditto - - 9l. 9s. to                                                                                                                                | 19 | 19 | 0  |
| 23  | Ditto 18-inch ditto - - 8l. 8s. to                                                                                                                                | 17 | 17 | 0  |
| 24  | Ditto 15-inch ditto - - 6l. 6s. to                                                                                                                                | 12 | 12 | 0  |
| 25  | Ditto 12-inch ditto - - 4l. 4s. to                                                                                                                                | 7  | 17 | 6  |
| 26  | Ditto 9-inch ditto - - 2l. 12s. 6d. to                                                                                                                            | 3  | 13 | 6  |
| 27  | Pair of 6-inch Globes, on mahogany stand, 2l. 2s. to                                                                                                              | 2  | 12 | 6  |
| 28  | Ditto 3-inch ditto - - 1l. 15s. to                                                                                                                                | 2  | 2  | 0  |
| 29  | Improved 3-inch Globe, in case, with meridian and horizon circles - - -                                                                                           | 0  | 16 | 0  |
| 30  | Three-inch Globe, in case - - -                                                                                                                                   | 0  | 9  | 0  |
| 31  | Larkin's Geometrical Solids - 7s. 6d. to                                                                                                                          | 1  | 4  | 0  |
| 32  | Models of Arches of Bridges - 5s. to                                                                                                                              | 2  | 0  | 0  |
| 33  | Dissected Cones - - - 7s. to                                                                                                                                      | 0  | 9  | 0  |
| 34  | Juvenile Collections of Geometrical Planes and Solids, with Sections of the Cone and Sphere—the set of 31 in a box - - 10s. to                                    | 0  | 15 | 0  |
| 35  | The set of 18 two-inch Models in Wood, to illustrate Reiner's Lessons on Form, 1l. 2s. 6d. to                                                                     | 1  | 10 | 0  |
| 36  | Glass Models to facilitate the study of Crystallography and Geometry—the set of 15 Secondary Forms, each enclosing its primitive Nucleus, in a box - - 2l. 8s. to | 3  | 3  | 0  |
| 37  | Dissected Cube, in box, with Octahedron for its Nucleus - - -                                                                                                     | 0  | 5  | 0  |
| 38  | Ditto with Tetrahedron - - -                                                                                                                                      | 0  | 6  | 0  |
| 39  | Ditto with Rhombic Dodecahedron - - -                                                                                                                             | 0  | 6  | 6  |
| 40  | Ditto with Pentagonal Dodecahedron - - -                                                                                                                          | 0  | 6  | 6  |
| 41  | A Cone with Sections - - -                                                                                                                                        | 0  | 2  | 6  |
| 42  | Ditto in Boxwood and pinned - - -                                                                                                                                 | 0  | 5  | 0  |
| 43  | Set of Models in Mahogany box, for teaching fractions - - 12s. 6d. to                                                                                             | 1  | 0  | 0  |
| 44  | Cabinets of Objects to illustrate Mayo's Lessons on Objects - - 1l. 17s. to                                                                                       | 2  | 0  | 0  |
| 45  | The New Educational Cabinet prepared under the direction of the Home and Colonial Infant School Society, for the use of Infant Schools, 2l. 7s. to                | 3  | 0  | 0  |
| 46  | Extensive variety of Mathematical, Arithmetical, Geographical, Natural History, and other instructive dissected Puzzles - - -                                     |    |    |    |

| NO. | £.                                                                                                                                                                                                                                                                                        | s. | d. |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
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| 52  | Cabinet with 340 still larger - - 107. to                                                                                                                                                                                                                                                 |    |    |
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